WESTERN GAS

December
1929

Lowering pipe along the Mississippi River Fuel Corporation right-of-way on its 431-mile line from Louisiana gas fields to St. Louis, Missouri.

20 Cents
the Copy

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11

A MONTHLY JOURNAL DEVOTED TO THE
WESTERN GAS & APPLIANCE INDUSTRIES

PRINT IN BINDING

WIN $250.00 CASH

18 Other Cash Prizes, Too! Total $500.00

WRITE A SIMPLE SLOGAN

This offer is open to every reader of this announcement. It makes no difference who you are or where you live. We want a new slogan for Nordstrom Valves. Whoever sends the best slogan will win $250.00. If you don't win the big cash prize, there are 18 other cash awards—any one of which may go to you.

"Won't Stick—Won't Leak" has been our slogan for years. But now we want something new—a slogan that will express in a few words the advantages of Nordstrom Valves. A brief synopsis of these advantages is given in this advertisement. Read it carefully. Or send for literature which may help you to submit the winning slogan.

Any slogan may win. No matter how simple your slogan may sound to you—send it in. You cannot afford to neglect this big opportunity to win one of the generous cash prizes offered. Remember—there is no obligation! The persons submitting the winning slogans will have nothing else to do. We have nothing to sell in this contest. Get busy with your slogans at once. A little time—a little thought—may win for you. Contest closes December 31st. Only a short time left!

CASH AWARDS	
First Prize -	$250.00
Second Prize -	100.00
Third Prize -	50.00
4 Prizes, each -	10.00
12 Prizes, each -	5.00
TOTAL 19 Cash Prizes	$500.00

Rules of Contest

Anyone is eligible except employees of Merco Nordstrom Valve Company or affiliated companies. Slogan must not exceed 10 words. Any number of slogans may be submitted by same person. Use coupon below or separate sheet of paper. If two or more contestants tie for any prize, each contestant will receive the full amount of the prize tied for.

MERCO

MAIL THIS ENTRY BLANK

MERCO NORDSTROM VALVE CO.,
343 Sansome St., San Francisco, Calif.

I submit the following slogan(s) pertaining to Nordstrom Valves:

_____

_____

_____

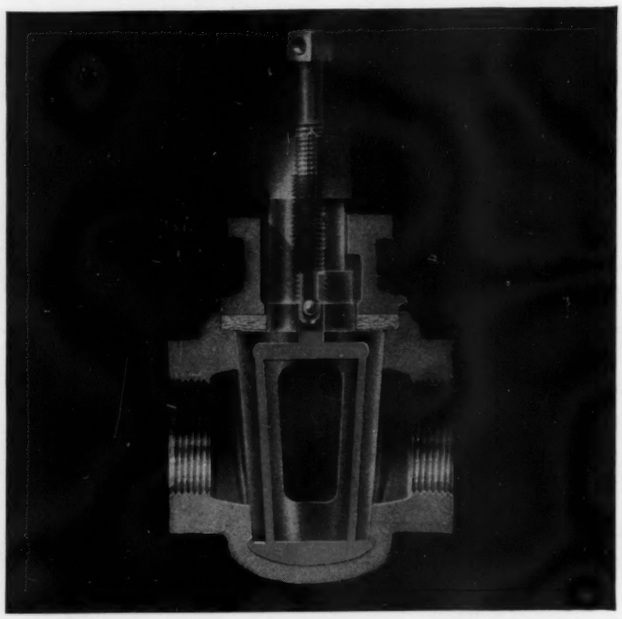
_____

Name_____

Address_____

City_____ State_____

(Use separate sheet if not sufficient room)



NORDSTROM VALVES *(lubricated)*

Stop Leaks
Prevent Sticking
Plug always easy to Turn

Nordstrom Valves are of the plug cock type, with lubrication and lifting features that make them easy and sure of operation. A stick of special "Merco" Lubricant is ininserted under the lubricant screw. The latter, when turned, forces the lubricant down and around the plug. Fluid or other material within the line cannot pass around the plug and leak out, or lodge in the seat. The plug is always easy to turn. Made in types and sizes to meet conditions in all industries.

Ask for Literature

Merco Nordstrom Valve Co.
SUBSIDIARY OF THE MERRILL COMPANY
Engineers - Manufacturers

Atlanta: Healey Bldg.
Boston: 184 Boylston St.
Buffalo: Genesee Bldg.
Chicago: 176 W. Adams St.
Dallas: Magnolia Bldg.
Detroit: 2842 W. Grand Blvd.
El Paso: 111 S. Virginia St.
Houston: Petroleum Bldg.
Los Angeles: 556 S. San Pedro St.
New Orleans: Masonic Temple Bldg.
New York: 11 W. 42nd St.
Pittsburgh: Clark Bldg.
Portland: Buyers Bldg.
San Francisco: 343 Sansome St.

AGENCIES IN PRINCIPAL CITIES
Factories—Oakland, California, and Belleville, New Jersey
Canadian Manufacturers:
Peacock Bros., Ltd., Montreal, Cobalt, Winnipeg, Vancouver.
England: Audley Engineering Co., Ltd., Newport, Shropshire.
Buenos Aires, Argentine:
Cenera! Electric, Soc. Anon., Victoria 618 Esq. Peru.

COMPRESSOR STATIONS

Engineered, Designed and Installed

Fluor installations are well balanced, economical and permanent.

Avail yourself of a specialized experience and save time and money.

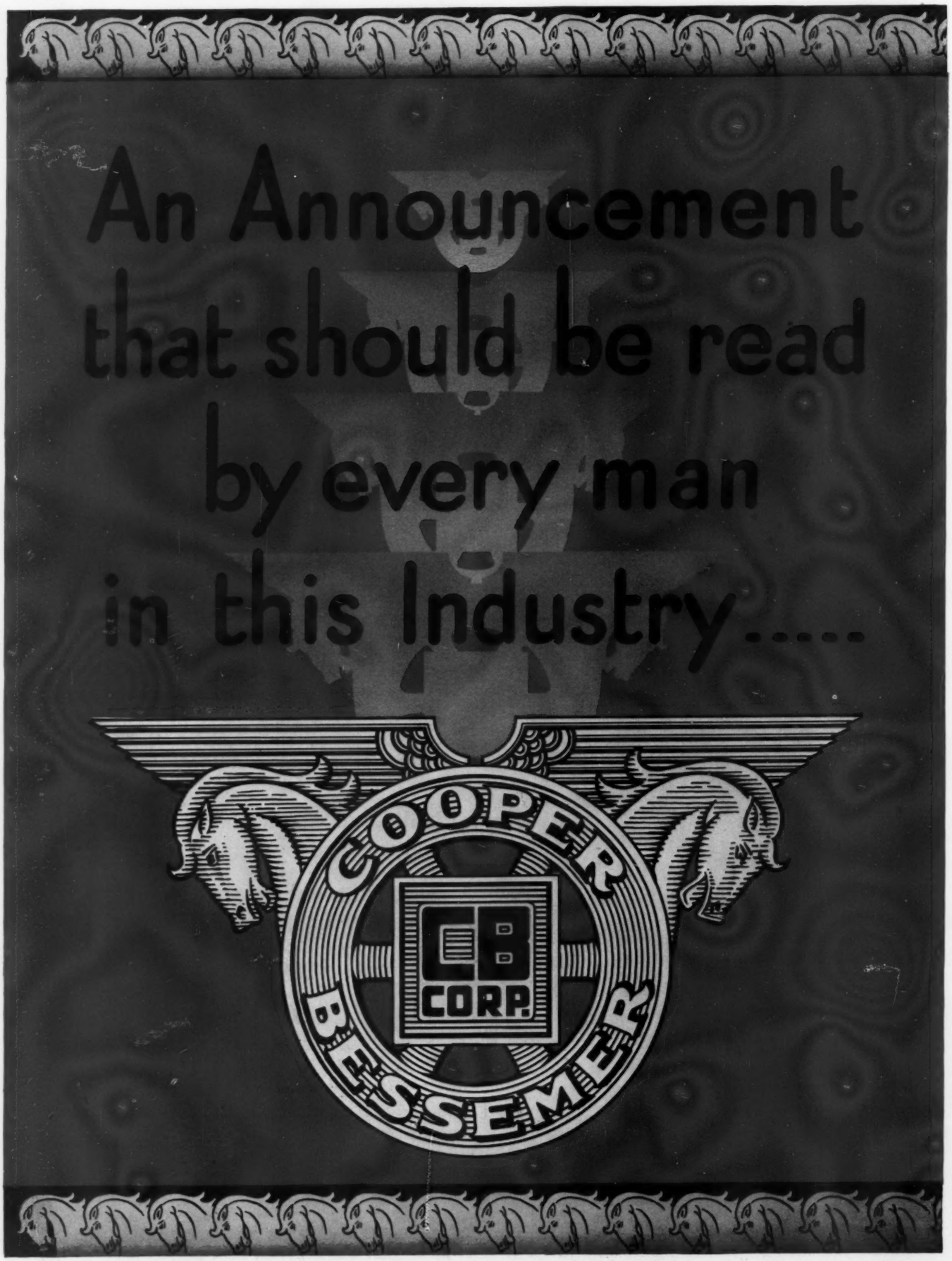
THE Fluor CORPORATION, LTD.

(Successors to Fluor Construction Co.)

909 E. 59th St., Los Angeles, California

Tulsa, Okla.	New York, N. Y.	Dallas, Texas	Houston, Texas
National Bank of Commerce Bldg.	30 Church Street	Magnolia Bldg.	Second National Bank Bldg.

December, 1929, Volume V, Number 12. WESTERN GAS is published by Western Business Papers, Inc., at 124 West Fourth Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 3 years $5.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, California, under the Act of March 3, 1879.


An Announcement
that should be read
by every man
in this Industry.....
COOPER
CB
CORP.
BESSEMER

Cooper Engines and Bessemer Engines are now

COOPER-BESSEMER ENGINES

IN the 96 years that Cooper engines and power machinery have been built at Mt. Vernon, the name "Cooper" has meant but one thing to Cooper customers and prospects—*Finest equipment of its type.*

And, in the 31 years that Bessemer engines and power machinery have been built at Grove City, the name "Bessemer" has meant—*Finest equipment of ITS type.*

Therefore, when the Cooper and Bessemer interests united for greater service to this Industry, they decided to retain the names "Cooper engines" and "Bessemer engines" until the time when the name COOPER-BESSEMER could command even more respect than Cooper or Bessemer alone.

That time is here. The two engine lines are combined and standardized into one. Every single engine has been improved, refined or redesigned. Cooper and Bessemer men, working together, have accomplished these results through joint research, experiments and tests. And the products of their united efforts have now thoroughly earned this greater name COOPER-BESSEMER.

While the individual engine names—COOPER, BESSEMER, HOPE—are now replaced, the former type numbers remain unchanged. A new, handy-reference, combined line folder has been prepared. It shows the type designation, range of sizes, construction and chief applications of every Cooper-Bessemer product.

THE COOPER-BESSEMER CORPORATION

Formerly The C. & G. Cooper Company and The Bessemer Gas Engine Company

Mount Vernon, Ohio Grove City, Pa.

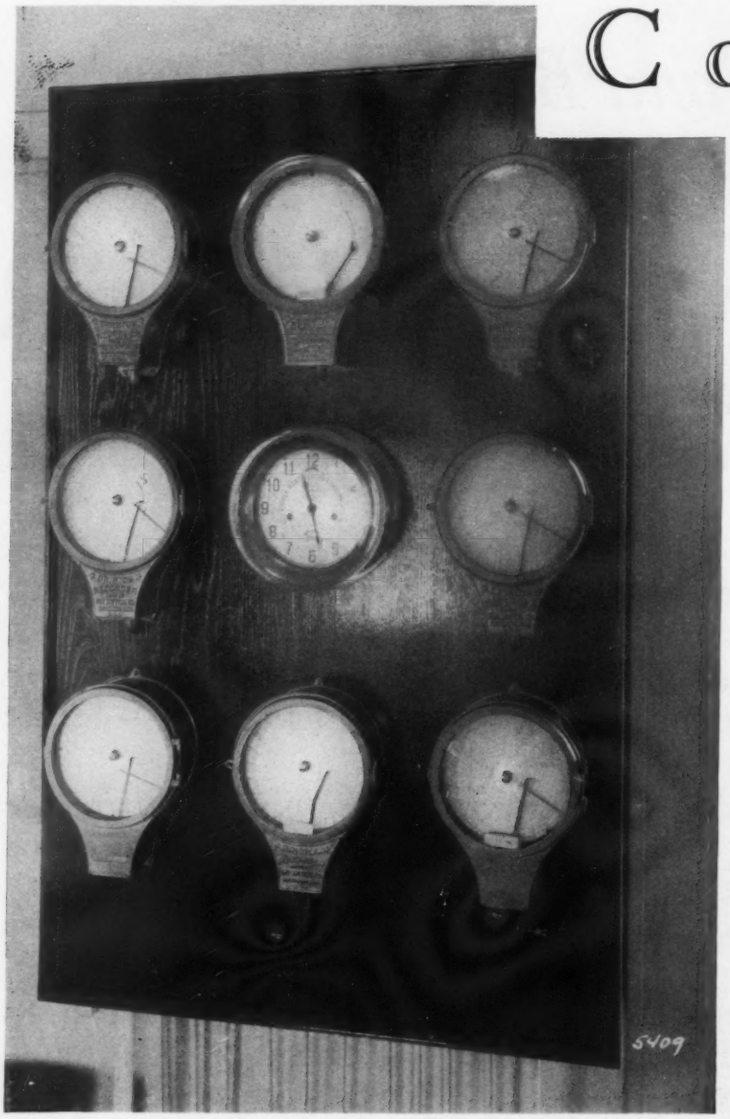
Branch offices in all principal oil and gas fields

Oklahoma Natural Gas Company

Secures more uniform Control of Operating Pressures

under direction of

BRISTOL'S Recording Gauges.



Bristol's Gauges shown above are used to record Gas Pressure in West line; on South line; on East line; Emergency discharge line; Intermediate Gas pressure at plant; Regular discharge line to City of Okmulgee, and Gas pressure at by-pass on South line.

Gas Pressure on incoming lines from the field, as well as the pressure in lines to the City of Okmulgee are automatically recorded by Bristol's Instruments shown in the accompanying illustration.

As these records are continuous, reference to the various instruments shows just what the pressure is; what it has been, and whether the trend is up or down or steady. Thus operatives are guided in regulating pressures, so as to assure both operating economy and good service. Also company officials have an unbiased, easily understood, report on each day's operation.

After operating a number of years these Bristol's Gauges have made an enviable record for accuracy, and trouble-free service . . . having required only minor re-adjustment and such routine attention as winding, changing charts, re-inking, etc.

Get in touch with our nearest Branch Office. District Sales Engineers will be glad to help solve your instrument problems. This engineering service carries no obligation.

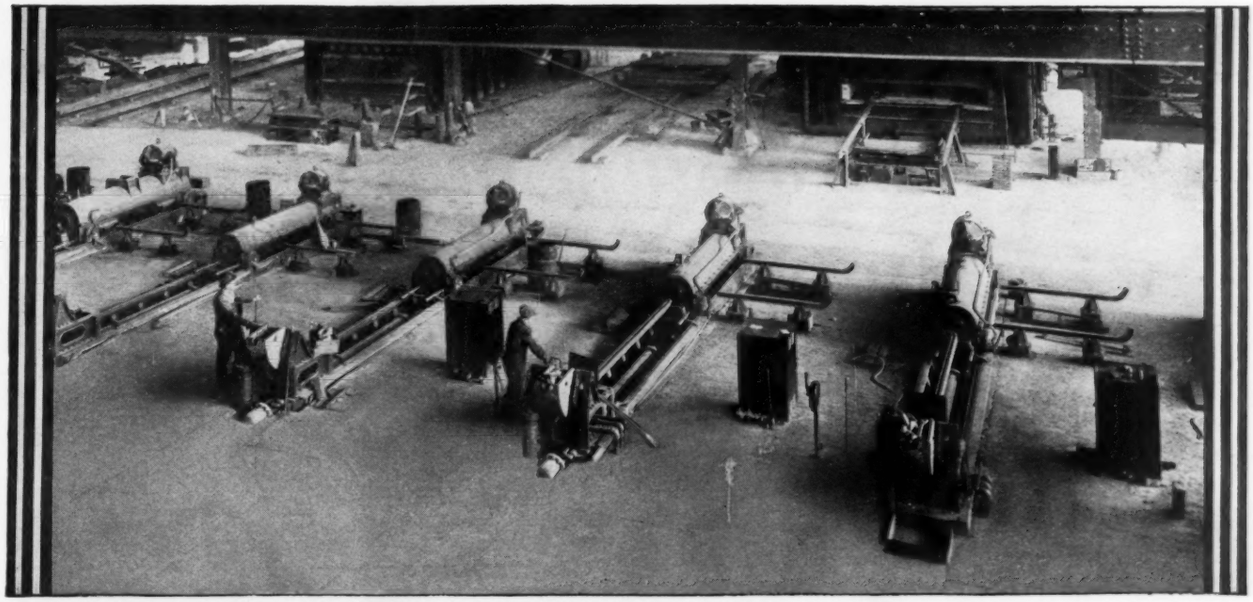
The Complete Bristol's line of Recording Instruments Includes:

Pressure-Vacuum Gauges, Thermometers, Psychrometers, Liquid Level Gauges, Pyrometers, Mechanical Motion Recorders, Electrical Operation Recorders, Voltmeters, Ammeters, Wattmeters, etc. Also both Air and Electrically-Operated Controllers and Motor Operated Controller Valves.

The Bristol Co., Waterbury, Conn.

Branch Offices:
Rialto Bldg., San Francisco, Calif.

Boston	Philadelphia	Birmingham	Detroit	Denver
New York	Pittsburgh	Chicago	Akron	St. Louis



Centrifugal casting in these machines gives deLavaud pipe...

100% greater tensile strength
65% greater transverse strength
25% greater bursting strength

IN a series of strength tests on deLavaud Pipe, conducted by a disinterested testing laboratory, the results shown above represent the strength of deLavaud as compared with pit cast pipe.

While these percentages appear startling at first glance, a careful comparison of deLavaud metal with pit cast will help to convince you of their authenticity. For deLavaud Pipe metal will appear dense and extremely close-grained, while the structure of pit cast pipe metal will be coarse and crystalline.

deLavaud Pipe is made by pouring molten metal into a revolving cylindrical mould. Centrifugal force holds the iron against the mould and drives out slag and gas bubbles *with a force 40 times greater than gravity.* Thus deLavaud metal is dense and fine in structure. And, it is remarkably free from weakening impurities.

In addition, the action of the water-cooled deLavaud mould and the subsequent annealing further improve the physical properties and the microstructure of the metal.

Let us send you all of the facts and figures on deLavaud Pipe; also the deLavaud Handbook which gives useful information about types of joints and dimension tables.

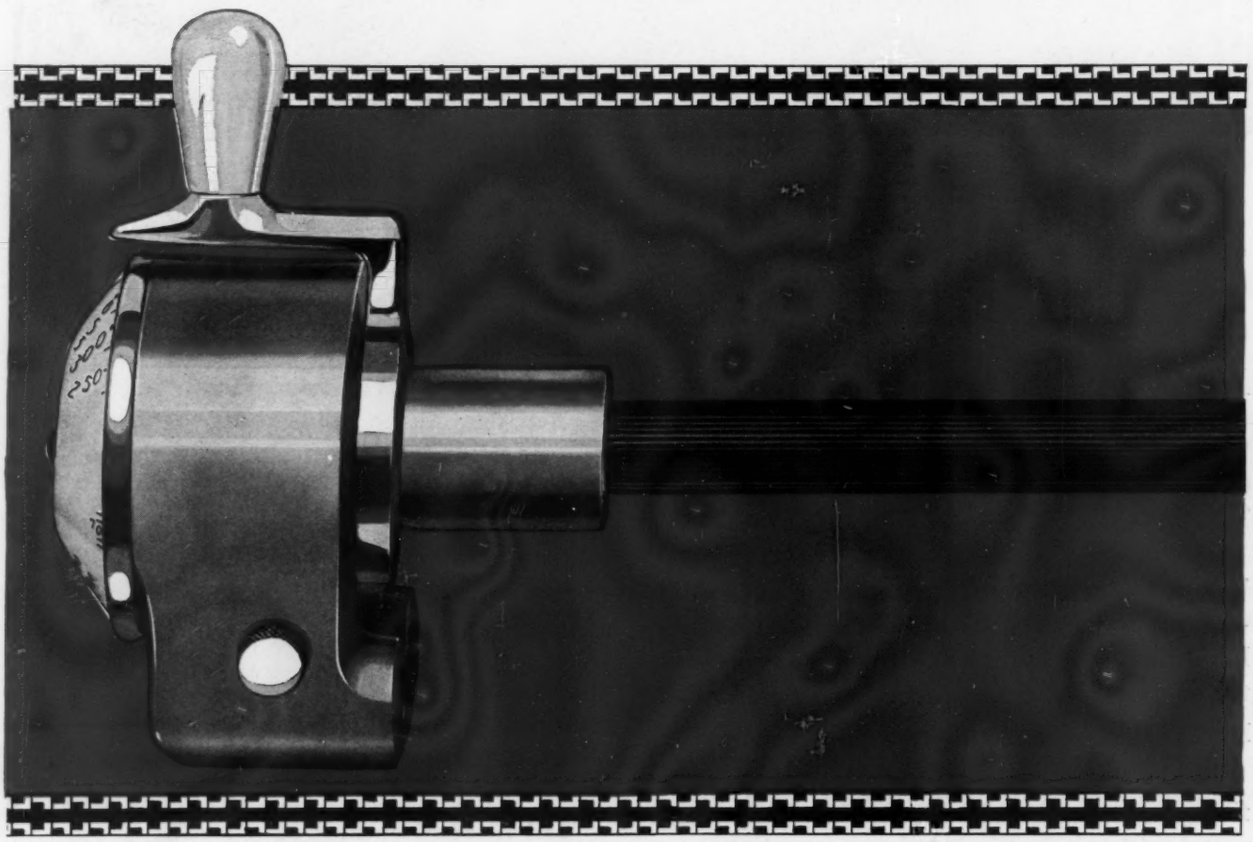
Cast iron pipe made by this Company bears the "Q-check" trademark of The Cast Iron Pipe Research Association.

United States Pipe and Foundry Co., Burlington, New Jersey

Sales Offices: **New York, Philadelphia, Pittsburgh, Cleveland, Buffalo, Chicago, Dallas, Birmingham, Kansas City, Minneapolis, Seattle, San Francisco, Los Angeles**

The NEW ROBERTSHAW

Chromium plated . . . .
Improved
Absolutely fool-proof



MORE THAN 100 of America's leading range manufacturers will include the new, improved Robertshaw AutomatiCook as standard equipment on their latest models! Hundreds of thousands of American women will want this new, finer, more handsome oven heat control on their ranges this year. And hundreds of dealers and their salesmen on the floor know that the AutomatiCook materially lowers sales resistance.

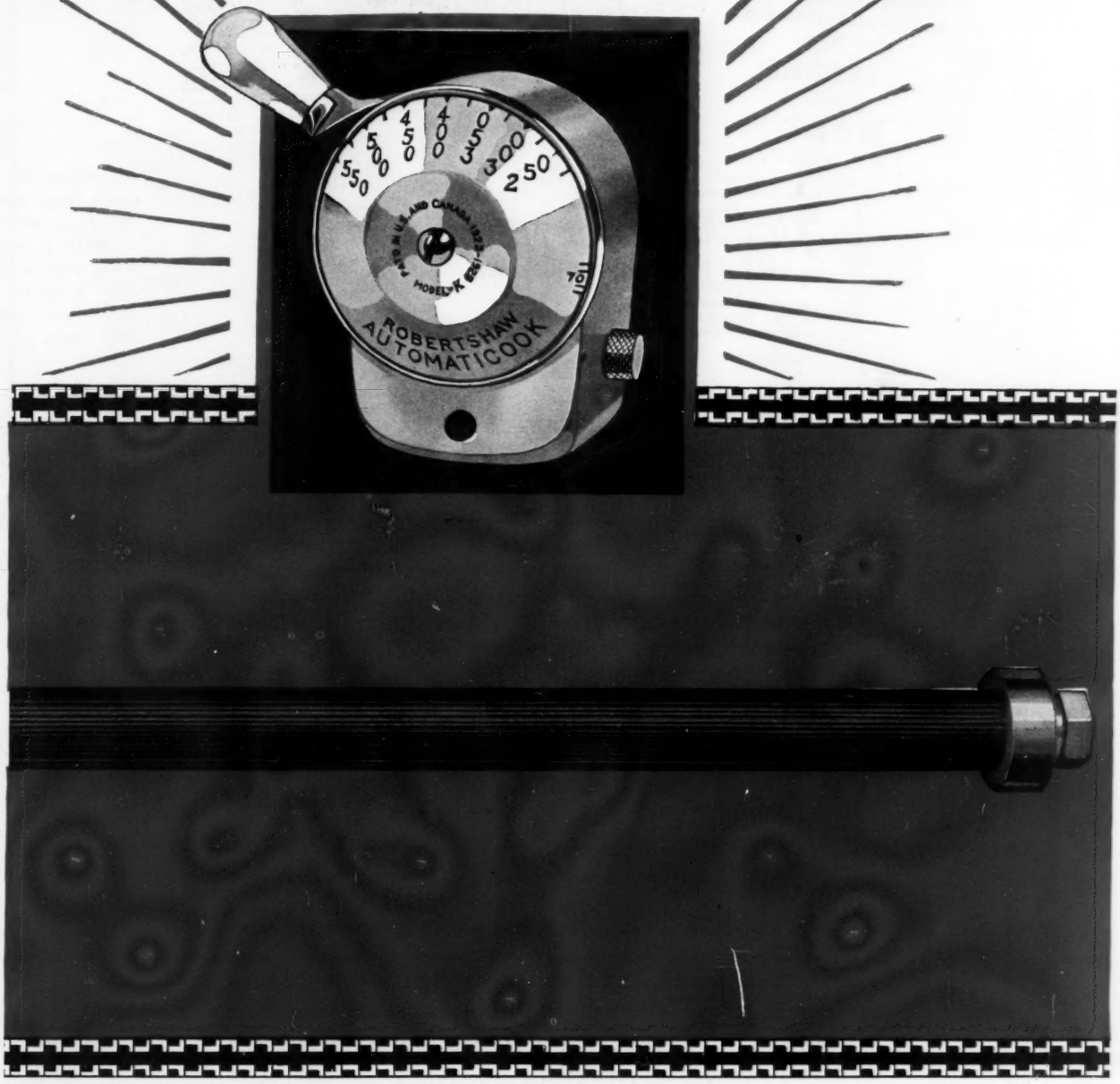
Just look at the advantages of the new AutomatiCook! It's smaller, and more handsome. The fine chromium plate can't rust or tarnish. The dial is fully visible; the familiar white handle more easily accessible.

But best of all, the new AutomatiCook is equipped with a one-minute temperature check—so simple that a child can operate it!

Insist that the ranges you stock are equipped with the Robertshaw AutomatiCook — the oven heat control with the white handle so familiar to hundreds of thousands of American women!

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Pa.

AUTOMATICOOK



WHAT IT DOES

1 Saves more gas per year than its cost and eliminates loss of foods.

2 Automatically maintains the correct oven temperature. Unnecessary to stay in or even near the kitchen when cooking.

3 Eliminates guess-work and the pies, cakes, biscuits, cookies, etc., are just right every time.

4 Assures the roasting of all kinds of meat and fowl—rare, medium, or well done—deliciously and without a single failure.

5 Makes possible the boiling of cereals, soups and vegetables in the oven at the same time the meat is being roasted.

6 Also the canning of fruits and tomatoes in the oven, the scientific way.

7 And the making of all peach butter, apple butter, tomato butter, etc., in the oven. No stirring necessary.

8 Provides for the automatic cooking of a complete meal in the oven at one time without attention.

9 And the drying and sterilizing of dishes in the oven giving them a clean, polished surface—affording a warming closet of large capacity.

10 Requires no experience and having no parts which can deteriorate, will operate correctly for the entire life of the range.

ROBERTSHAW

TRADE MARK

AutomatiCook

Reproduction of seven large newspaper advertisements used in the San Francisco Bay Region to announce lower fuel costs.

Removing the Last Objection to Gas-Fired Heating

Did Mr. and Mrs. Public read the above newspaper ads?

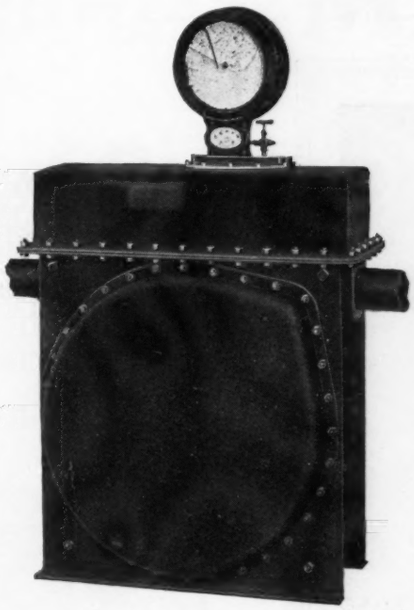
They certainly did. And they are buying gas-fired heating equipment to prove it, which all goes to show that there has been but one traditional objection to gas heating and that was—cost of operation.

Now that the old objection is removed completely, with the coming of cheap natural gas fuel, everybody is turning to gas-fired heating. Rising sales curves of all those engaged in the heating business verify it.

PACIFIC GAS AND ELECTRIC COMPANY

P·G·and E·

Owned · Operated · Managed
by Californians



Again— The EMCO Five

THE usual large capacity positive gas meter requires much more space than does the EMCO FIVE. This meter requires slightly over four square feet of floor space and is just over three feet in height. The entire assembly weighs approximately 900 pounds. The compactness is greatly appreciated when manifolding installations are to be made.

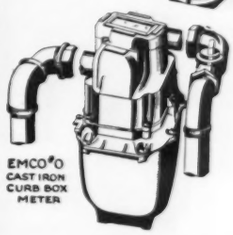
The Pittsburgh Equitable Meter Company was the first meter manufacturer to use the cadmium plating process on all steel and iron working parts as a further protection against deterioration. Needless to say the EMCO FIVE is rust-proof.

And again, a big feature in design construction of this meter is the interchangeability of all parts.

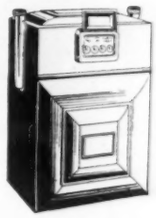
EMCO—*wherever you go.*

EMCO #0 CAST IRON DRY GAS METER

IRONCLAD CAST IRON DRY GAS METER

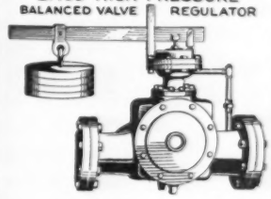


EMCO #0 CAST IRON CURB BOX METER

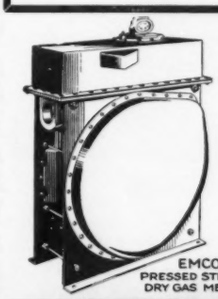


EMCO TIN METER

EMCO HIGH PRESSURE BALANCED VALVE REGULATOR

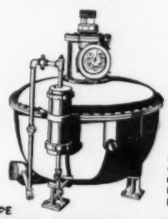


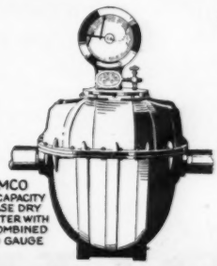
EMCO WATER HEATER AND GAS APPLIANCE REGULATOR



EMCO #5 PRESSED STEEL TYPE DRY GAS METER

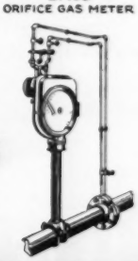
WESTINGHOUSE FLUID POSITIVE GAS METER



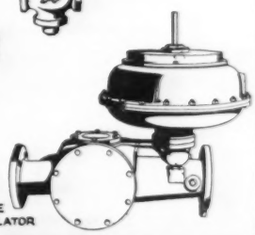


EMCO LARGE CAPACITY CAST CASE DRY GAS METER WITH EMCO COMBINED RECORD GAUGE

EMCO ORIFICE GAS METER



EMCO DOMESTIC SERVICE REGULATOR



EMCO LOW PRESSURE BALANCED VALVE REGULATOR

PITTSBURGH EQUITABLE METER COMPANY

MAIN OFFICE AND WORKS PITTSBURGH, PA.

NEW YORK CHICAGO COLUMBIA, S.C. LOS ANGELES DALLAS TULSA SEATTLE KANSAS CITY SALT LAKE CITY

To our many friends in many places, we express anew our heartfelt Christmas greetings.

A Cheerful Season—And a Cheerful Theme

Christmas season.—In every mind it calls up different memories. It is the time of homecoming for those who wander. Memories steal quietly back through the mists of years to childhood scenes. And once more united through the bonds of recollection, we sit down before the Christmas fire with those we love.

The Humphrey Radiantfire plays a cheerful part in the Yuletide happiness. The old fireplace, which in this modern day no longer holds the great Yule log, is still alive. Brightness and comfort permeate the home. And to the visible radiant cheer is added the health-giving qualities of the summer sun, contained in the invisible infra-red and ultra-violet rays.

Throughout the year, but perhaps more especially at Christmas time, the Humphrey Radiantfire becomes, not an inanimate piece of household equipment, but a live, cheerful part of family life.

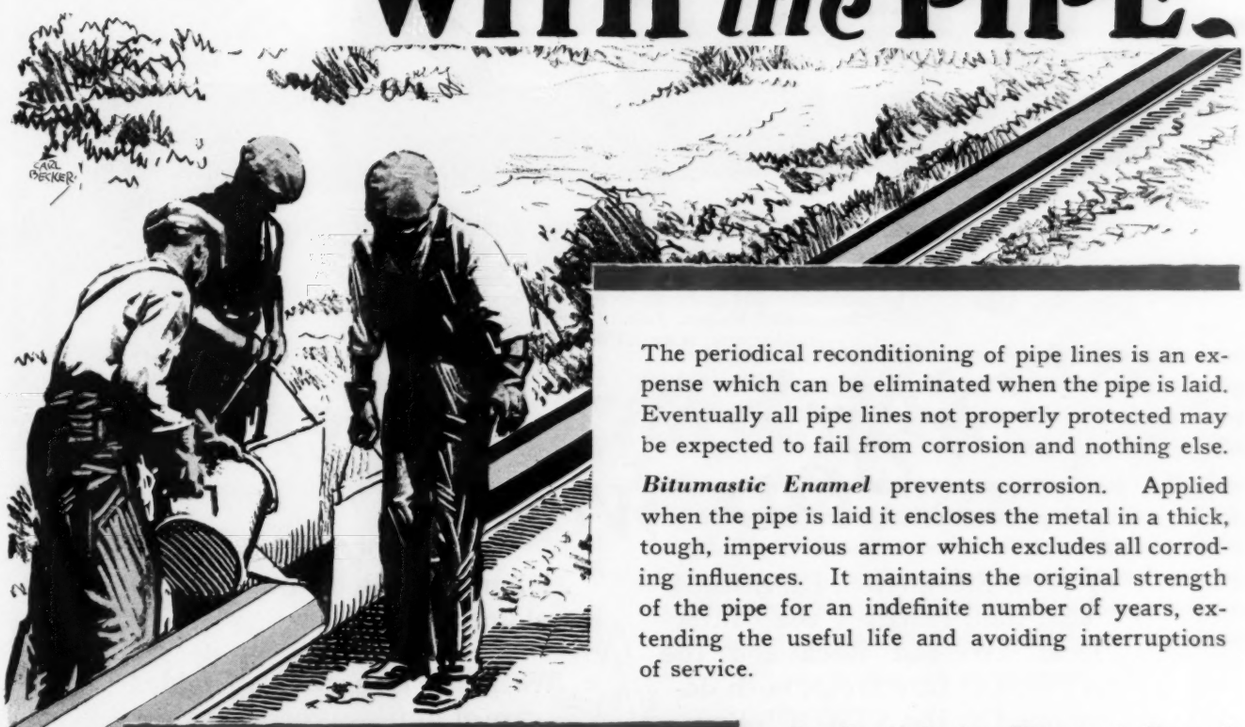
The HUMPHREY Radiantfire

TRADE MARK REG. U.S. PAT. OFF.

Manufactured by
General Gas Light Co.,
Kalamazoo,
Michigan

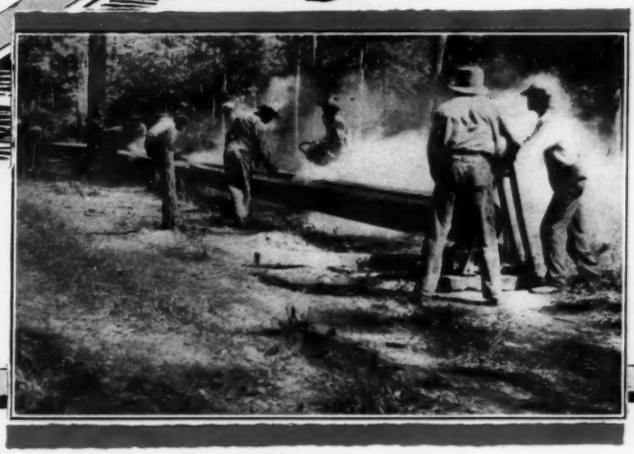
Pacific Coast Manager
C. B. Babcock Co.,
135 Bluxome St.,
San Francisco

Bury the MAINTENANCE WITH *the* PIPE.



The periodical reconditioning of pipe lines is an expense which can be eliminated when the pipe is laid. Eventually all pipe lines not properly protected may be expected to fail from corrosion and nothing else.

Bitumastic Enamel prevents corrosion. Applied when the pipe is laid it encloses the metal in a thick, tough, impervious armor which excludes all corroding influences. It maintains the original strength of the pipe for an indefinite number of years, extending the useful life and avoiding interruptions of service.



So effectively does ***Bitumastic Enamel*** eliminate nearly all maintenance on lines to which it is applied that it virtually becomes a maintenance force, buried underground and working continually without wages.

Send for your copy of "The Protection of Oil and Gas Lines." It contains information pertinent to any pipe line projects you are contemplating.

ARKANSAS NATURAL GAS LINE

This 137 mile 20-inch gas line just completed between the Monroe (La.) fields and Shreveport is Bitumastic protected throughout.

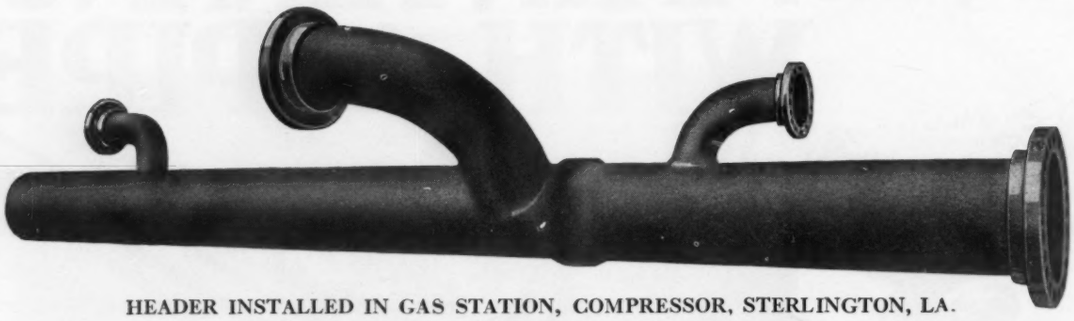
Illustration shows application of Bitumastic Enamel on 60 ft. lengths by use of our patented Turning Rigs.

BITUMASTIC
REG. U.S. PAT. OFF
ENAMEL

Wailes Dove-Hermiston Corporation
17 Battery Place, New York

2464 Enterprise St., Los Angeles, Calif. 345 Vermont St., San Francisco, Calif.
Philadelphia Cleveland Chicago Houston Tulsa San Francisco

"as strong as the pipe itself"



HEADER INSTALLED IN GAS STATION, COMPRESSOR, STERLINGTON, LA.

Fabricated for Henry L. Doherty & Co., Engineers, for Republic Construction, Monroe, La. 400 lb. working pressure. 20″ O.D. x ½″ L.W. Pipe, 16″ and 8″ ATWOOD "Interlock" Necks. Just to the right of 16″ neck (center one) is an ATWOOD Line Weld.

ATWOOD Welded Piping

THE Sterlington, La. Installation, features the "Interlock" Welded Neck and the ATWOOD Line Weld, both developed by the ATWOOD Pipe Fabrication Department . . . based upon seventy years' close contact with Industrial and Power Piping . . . to meet the extreme conditions demanded of modern high pressure lines, for whatever service intended.

The success of ATWOOD Piping depends entirely upon the strength of the wrought material . . . always a known quantity . . . and is independent of the welding.

We make a specialty of taking care of unusual conditions and will be glad to submit designs and estimates upon receipt of specifications.

Many of the largest Piping Installations *all over the world* are ATWOOD designed, fabricated, and even installed . . . No doubt ATWOOD Service can greatly aid you in the solution of your problems. Further information will be gladly furnished upon request.

Send today for ATWOOD Oil and Gas Bulletin 100.

PITTSBURGH VALVE, FOUNDRY & CONSTRUCTION CO.

PITTSBURGH ~ PENNA.

DISTRICT OFFICES

New York City	30 Church Street
Chicago, Ill.	80 East Jackson Blvd.
Boston, Mass.	185 Devonshire Street
Cleveland, Ohio	858 Rockefeller Bldg.
Dallas, Texas	1314 Southwestern Bldg.

REPRESENTATIVES

Detroit, Mich.	Garrett Burges, Inc., Woodbrook Bldg.
Houston, Texas	Maintenance Eng. Corp., 1400 Conti Street
Atlanta, Ga.	Moore-Broach Eng. Co., Forsyth Bldg.
Philadelphia, Penna.	R. J. Crozier Co., 10 South 18th Street
Los Angeles, Cal.	John G. Bell Co., 712 East Sixth Street
Toronto, Canada	A. G. Hill, 45 Jarvis Street

Founders Since 1825 ▲ Valves and Fittings Since 1866

"Cutting the Mile in two"
with double length pipe!
DOUBLE LENGTH "NATIONAL" PIPE
NATIONAL
In the laying of this 18 mile line of 12-inch double random length NATIONAL Pipe there was a considerable saving, due to eliminating approximately one-half the number of joints. In addition to the saving in time, labor and joint-making materials, the possibility of leakage is also reduced and an all around better line is the result.
NATIONAL is the only lap-welded pipe made in double random lengths and, aside from this feature, it is especially desirable for gas lines because of its high tensile strength, uniform structure, good welding qualities and resistance to corrosion—assuring a strong, sound, dependable line from end to end. Ask for Bulletin No. 26.
NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation
NATIONAL

150 NEW READERS A MONTH—

Growing with the building construction industry of the Pacific Coast area, West Coast Builder is receiving an average of 150 NEW PAID subscribers per month. FIVE new readers every day—architects, contractors, sub-contractors, material dealers, building officials—each of whom is a progressive factor in an industry spending approximately $500,000,000 a year!

Coverage and Reader Interest stand paramount in the minds of potential advertisers when selecting a medium. Putting a message "across" and making it "pull" are the functions of a successful trade journal.

Well illustrated building construction and news features, practical articles on solutions to industry problems, new products, building projects being started, and other valuable informative material make West Coast Builder a most economical medium in which to carry sales messages on building equipment and supplies.

Published monthly by

Western Business Papers, Inc.

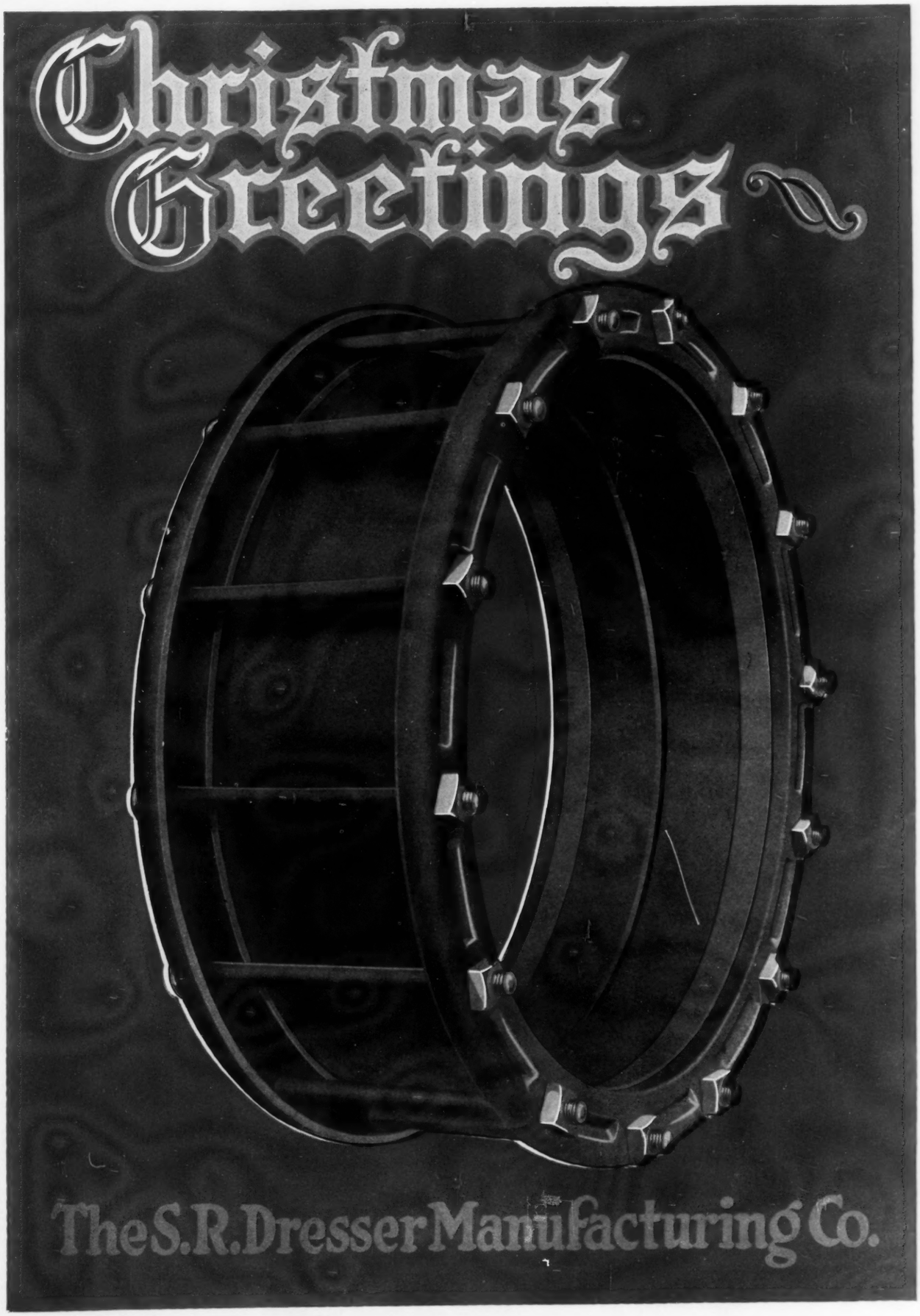
Publishers of:

WESTERN GAS

PACIFIC OVERSEAS COMMERCE

WEST COAST BUILDER

124 W. 4th Street - - - - - - - Los Angeles, Calif.


Christmas Greetings
The S. R. Dresser Manufacturing Co.

Laying 12"
Steel Main
at Reading, Pa.

For GAS MAIN CONSTRUCTION

Three important factors in low construction costs obtained by this organization are as follows:

EQUIPMENT

On each job adequate modern labor-saving equipment is provided at rental rates which represent only the actual carrying charges.

PERSONNEL

Each field organization is composed of experienced men who are specialists in pipe line construction.

In addition the services of our home office staff — made up of experts in all types of engineering and construction — are available when required.

FORM OF CONTRACT

All our work is done on the basis of actual cost plus a fee as our compensation. Under this form of contract, 100% of all savings revert to the client.

This method operates in the interests of both our clients and ourselves.

THE U. G. I. CONTRACTING COMPANY

DIVISION OF

UNITED ENGINEERS & CONSTRUCTORS

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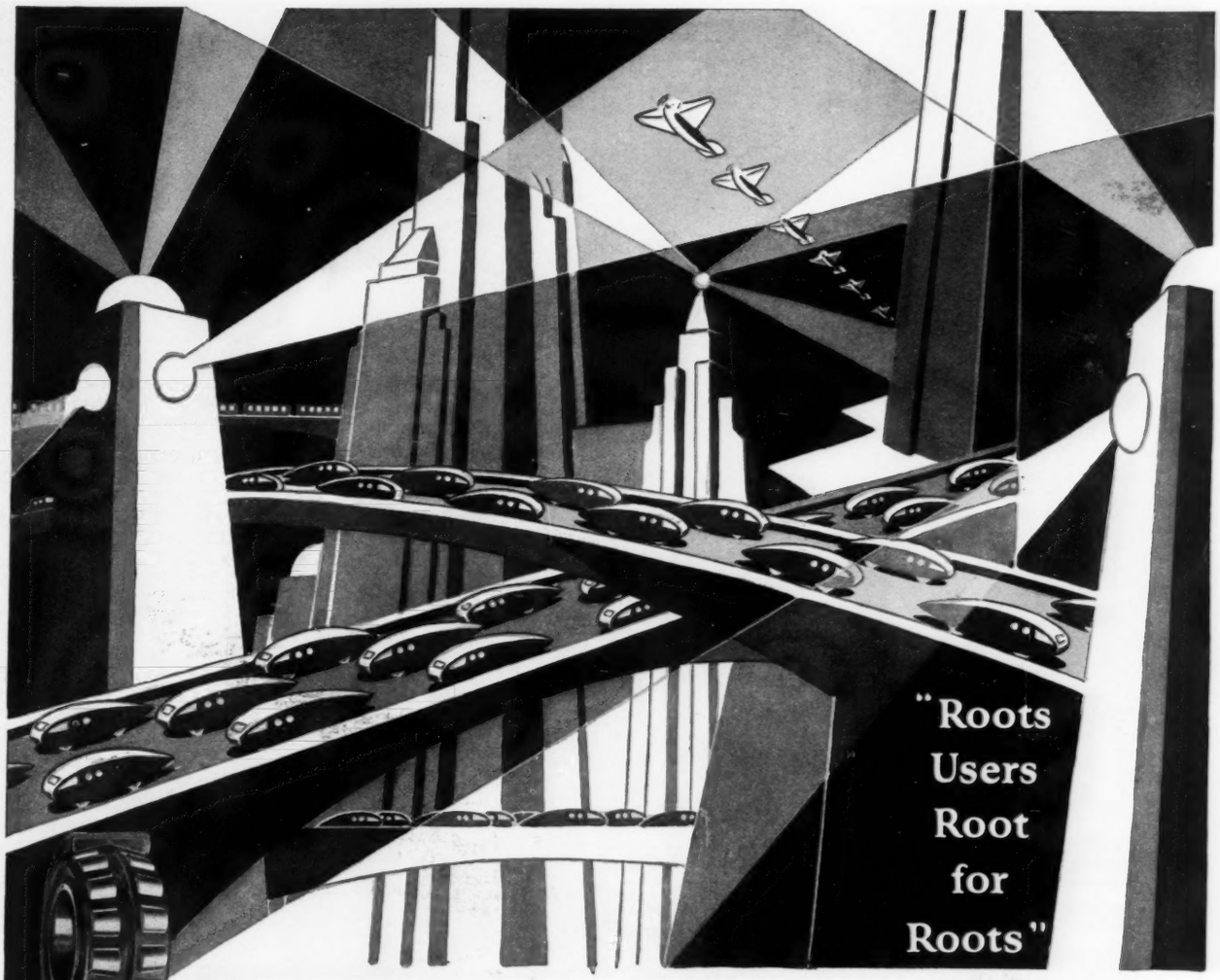
DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
Broad and Arch Streets

Chicago
Conway Building

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED



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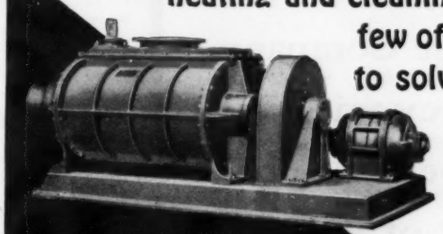
The Roots of Future Cities-

Growing cities of the future will increase the demand for Roots Meters, Gas Pumps, Liquid Pumps, Vacuum Pumps and Blowers. ¶ New ventilating, conveying, transporting, vacuum heating and cleaning and sewage disposal methods are only a few of the problems that Roots Units will be called upon to solve. ¶ Roots not only keeps abreast of the times – we think ahead. Let us straighten out your difficulties while they are still in the paper and plan stage. Our booklet 10-B1 will give you the idea in general.



The P.H. & F.M. ROOTS CO.

CHICAGO Peoples Gas Building — CONNERSVILLE, INDIANA — NEW YORK 120 Liberty Street

Western Representative: SUTOR & CO.
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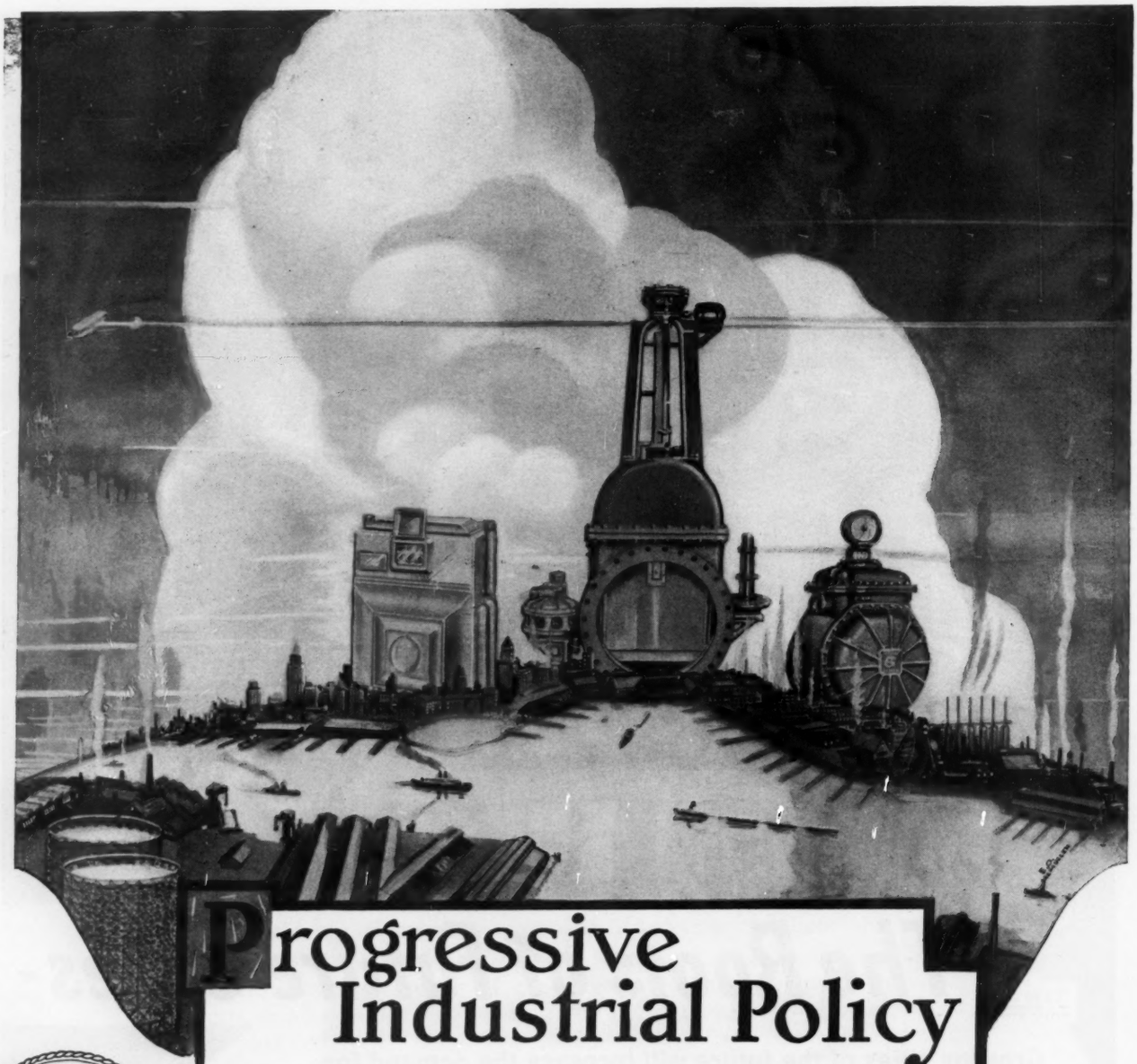

Progressive Industrial Policy

Promotes constant inquiry and activity directed at improvements in product and service. American Meter Company is operated under this policy without experiment at customer's expense. It has brought the beneficial result of an authoritative Leadership in Gas Measurement Engineering.

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Established 1901 *for Pacific Coast Requirements*

AMERICAN METER CO MEASUREMENT ENGINEERS CUBIC FEET

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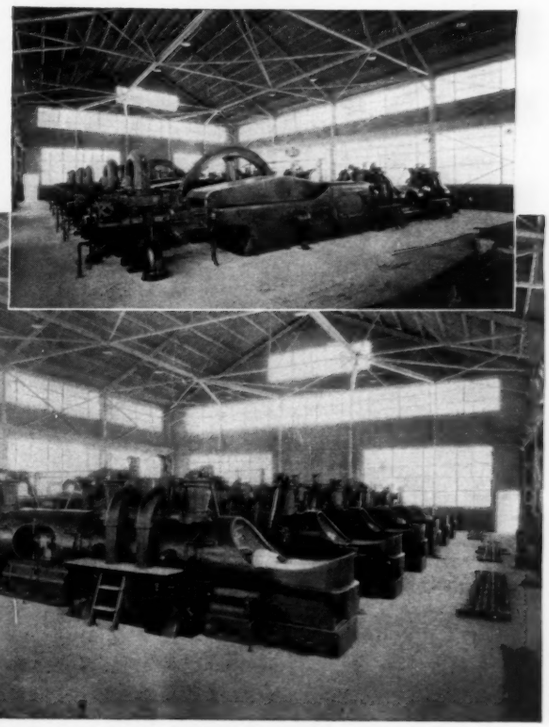

Three Worthington 22-inch x 36-inch Twin Tandem Gas-engine-driven Gas Compressors at the Channing, Texas, Station of the Amarillo to Denver Pipe Line

Gas from Amarillo to Denver . . . pumped by Worthington Gas-engine-driven Compressors

NATURAL gas in Denver . . . from the Amarillo Fields . . . is a reality. A new industrial era has been opened for that city and the intermediate areas served by this great pipe line.

The gas is pumped by three Worthington Twin Tandem Gas-engine-driven Compressors at the Channing, Texas, Station. Each of these units develops 1,000 horsepower and has a capacity of 33,000,000 cubic feet per 24 hours. Additional Worthington equipment in this station consists of three Single Recompressor Engines of 170 horsepower each.

A second station, at Model, Colorado, is now under construction, and will be equipped with three similar main units of 37,000,000 cubic feet per 24 hours each.

Worthington equipment was chosen for this line squarely upon its *record of performance* on other important lines.

Construction and operating engineers have found that, as the oldest builder of gas engines in the United States, Worthington draws upon a wealth of experience which makes reliable operation and low-cost maintenance a certainty.

Moreover, Worthington offers a complete service in the erection and installation of compressor stations . . . through its associated engineers, A. M. Lockett and Company, New Orleans.

Write for Bulletin S-550-B1, describing in detail Worthington Horizontal Four-cycle Double-acting Gas-engine-driven Gas Compressors

WORTHINGTON

PUMPS
COMPRESSORS
CONDENSERS *and* Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL *and* GASOLINE METERS

Literature on Request

EGR-4

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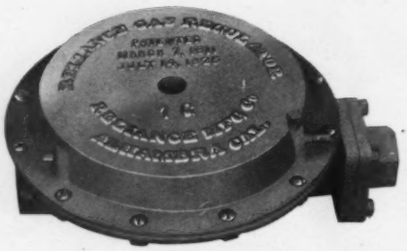
WORTHINGTON

Reliance Regulators



House Type
High Pressure Balanced Valve
Low Pressure Balanced Valve
High Pressure Compounding
Propane, Butane or Bottled Gas

The Reliance Line now includes a regulator for every purpose in sizes up to six inches, all embodying their patented toggle joint action. Fifteen years experience has proven conclusively that for positive lockup, sensitive and close regulation, great capacity and low cost of upkeep, this device has no equal.

Our new plant, made necessary by the constantly increasing demands for the Reliance, enables us to give most prompt and efficient service.

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Mid-Continent
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Gas vacuum line of Naylor Pipe at St. Louis, Oklahoma. 40'0" joints, 16" diameter.

Lowest Cost Per Foot In The Ground

NAYLOR PIPE costs less per foot in the ground than any other pipe carrying standard weight pressures. No other pipe can be laid as cheaply.

Naylor Pipe is the lightest of all pressure pipe. It weighs only half as much as standard weight wrought pipe.

This light weight is a money saving advantage. It means half the freight to pay; half the weight to haul; half as many men needed for handling in the field; speedier laying. These advantages lower your pipe line costs.

Besides light weight, Naylor Pipe is also made of Toncan Iron for greater resistance to rust and corrosion. Longer life of the pipe means fewer renewals..consequently, lower maintenance costs.

Lay your next pipe line at the lowest cost per foot in the ground. Naylor Pipe will help you to do it.

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Mo-lyb-den-um IRON

Standardized Naylor Pipe is made in sizes 6" to 12" I. D. and 14" to 20" O. D. in any uniform length desired up to 40' 0". Ends made to wrought pipe standards for all types of coupling.

Where corrosion resistance is not a factor, Naylor Pipe can be furnished in steel.

Toncan Copper Molybdenum Iron is a development of Central Alloy Steel Corporation, the world's largest and most highly specialized alloy steel producers. It possesses a superior corrosion resistance, making it the favored pipe material.

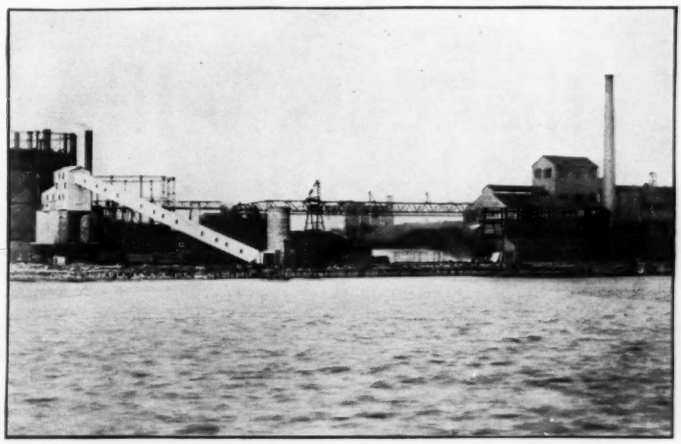
To The Members of
The Gas Industry Everywhere
We Wish You A Heartfelt

Merry Christmas
and a
Happy, Prosperous
New Year

Safety Gas Main Stopper Co.

523 Atlantic Avenue **Brooklyn, N. Y.**

U. G. I. VERTICAL CHAMBER OVEN



Wisconsin Gas and Electric Company at Racine,
Showing U. G. I. Vertical Chamber Oven plant

Average Operating Results

	Dubuque	*Racine*	*Clinton*
Daily capacity — cu. ft.	698,000	3,030,000	594,000
Corrected Gas in cu. ft. per lb. of dry coal—	6.44	7.64	6.85
per ton of dry coal—	12,880	15,280	13,700
Heat units in gas per lb. of dry coal—B. t. u.	3,605	4,005	3,721

THE U. G. I. Vertical Chamber Oven is the latest advance in carbonizing equipment for gas company use and offers these advantages:

Designed for the manufacture of gas with coke as a by-product
Produces domestic coke of the highest quality
"Steaming" gives dilution without addition of inerts
Flexibility of operation with coal gas heating
Low maintenance due to low operating temperatures, rugged construction and gravity discharge
Low labor cost due to simplicity of operation and regulation
High capacity per square foot of ground space

U. G. I. Vertical Chamber Ovens have been installed at Racine, Wis., Dubuque, Ia. and Clinton, Ia. and are under construction at Bangor, Me. and at Racine (second unit).

THE U. G. I. CONTRACTING COMPANY

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MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

A Proven Method . .

that cuts billing and bookkeeping costs . . . 25%

7 Outstanding Advantages of The Register Sheet System

1. Lower costs.
2. Faster billing.
3. Faster cash posting.
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5. Greatly reduced volume of records.
6. Insurance against misfiling or losing records.
7. Complete and rapid reference medium.

THE REGISTER SHEET SYSTEM, developed by public utility accounting specialists, is now actually in use by a large number of prominent gas, water and electric companies. This system has demonstrated many outstanding advantages and increased the efficiency of their customers' billing and bookkeeping departments.

You will find that the commercial cost per account per month is 25% less than with other methods. The majority of companies using this system use but one employee to every 5000 accounts.

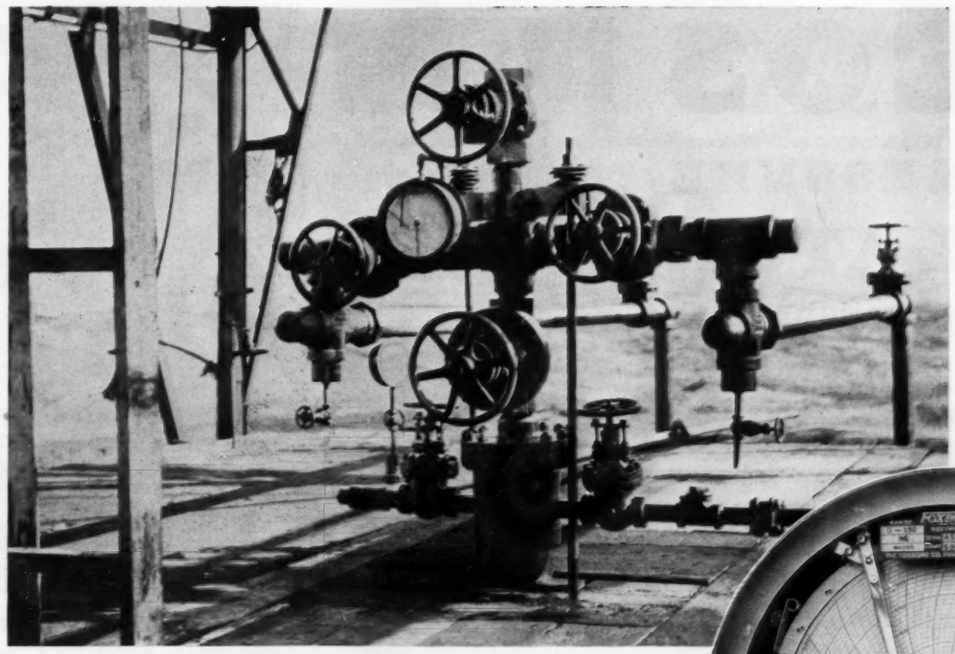
Detailed information about the Register Sheet System and its application to your individual requirements is available. Ask for a descriptive folder, or better still, let us send one of our corps of trained specialists to explain the system in person. Your acceptance of this offer incurs no obligation whatever.

Public Utility Sales Department

Remington Rand

BUSINESS SERVICE

BUFFALO, NEW YORK



Typical installation of a Foxboro Recording Pressure Gauge on a gas well head

(Below) The Foxboro Recording Pressure Gauge

These Continuous Pressure Records are INVALUABLE

CONTINUOUS written records of pressure at the well heads will inform you when you have water encroachment; heading conditions in the well; and when you should shift to gas lift.

On a pumping well the recording gauge gives clear indications of the condition of the pumps.

When repressuring, with the use of recording gauges you can find the actual rock pressure and closely approximate the porosity of the sand structure.

Recording Gauges can also be used to great advantage in measuring open flow gas volumes and gas flows at low (atmospheric) pressure.

Wherever pressure or vacuum gives an indication of operating conditions, the accurate, sturdy, and dependable Foxboro Recording Gauges should be installed.

They should be used also because the initial cost is not high and the maintenance cost is exceedingly low.

Get in touch with the nearest Branch Office.

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J. E. Treacy, Strada Golesti No. 9, Ploesti, Roumania

Agents for Robinson Patented Orifice Flange Fittings

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

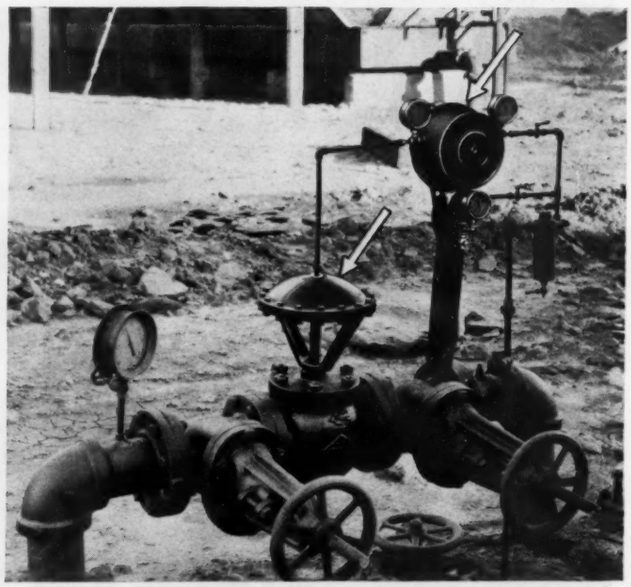
INSTRUMENTS *for* CONTROLLING, RECORDING *and* INDICATING TEMPERATURE, FLOW, HUMIDITY and PRESSURE

TYCOS

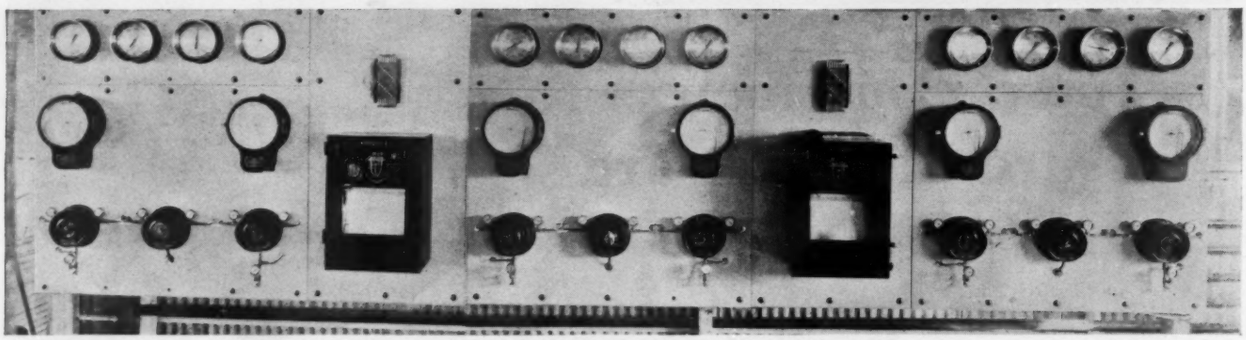
BACK PRESSURE REGULATOR

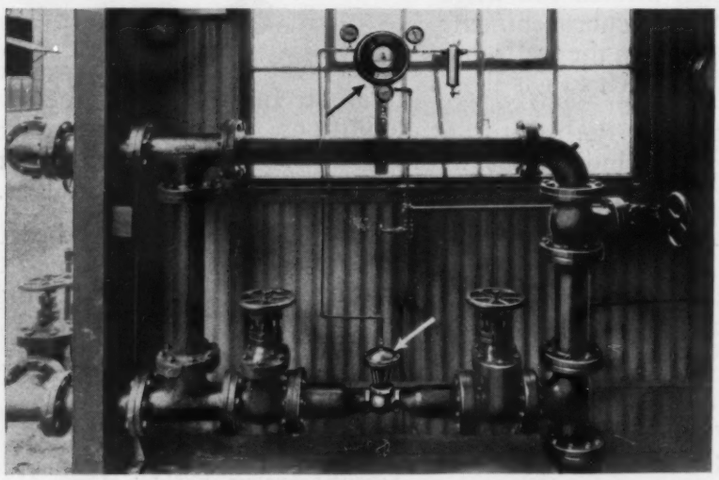
(PILOT OPERATED)

A flexible system of control with a wide application



Note the many usages illustrated—upper photo: the regulator on residue gas line in natural gasoline plant. Center; nine regulators applied to gasoline stabilizers and fractionating towers. Lower photo: regulator controlling gas supply to battery of boilers.





THE TYCOS Back Pressure Regulator is a pilot operated controller, operating either by compressed air or gas. The auxiliary pressure supply works directly against an air valve in instrument proper. This in return operates the pilot valve to release or transmit necessary motive pressure for opening and closing control valve.

The TYCOS Regulator affords immediate, sensitive and positive response to the slightest fraction of pressure change. It can be readily changed from a back pressure controller to a reducing pressure regulator. Also changed from a higher pressure to a lower pressure controller, or vice versa. Complete details on request.

Westcott & Greis, Inc.—1945 Santa Fe Avenue—Los Angeles

WESTCOTT & GREIS

MEASUREMENT AND CONTROL

THESE EXCLUSIVE

FEATURES OF N. G. E. GAS BURNERS

TYPE A ••• MEAN FREEDOM FROM UPKEEP EXPENSE •••

LOWER POWER COST ••• INCREASED BOILER CAPACITY

High efficiency over a wide range of steam demands from light to peak loads . . .

freedom from noise and vibration . . .

continuous dependable operation . . .

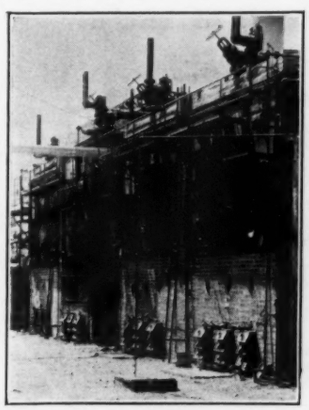
nothing to adjust or get out of order . . .

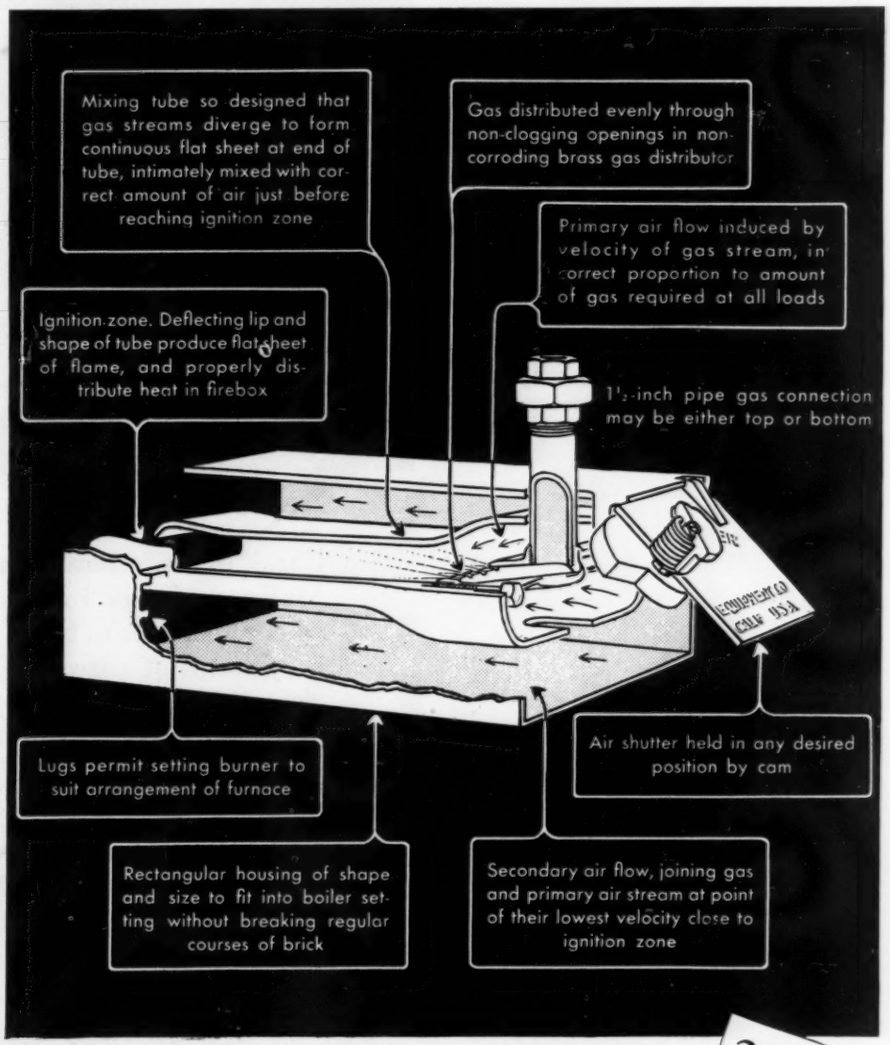
easy and simple to install in all types of boilers . . .

make best possible use of limited combustion space . . .

simple to light and safe to operate . . .

especially designed for automatic control . . .




Mixing tube so designed that gas streams diverge to form continuous flat sheet at end of tube, intimately mixed with correct amount of air just before reaching ignition zone
Gas distributed evenly through non-clogging openings in non-corroding brass gas distributor
Primary air flow induced by velocity of gas stream, in correct proportion to amount of gas required at all loads
Ignition zone. Deflecting lip and shape of tube produce flat sheet of flame, and properly distribute heat in firebox
1½-inch pipe gas connection may be either top or bottom
Air shutter held in any desired position by cam
Lugs permit setting burner to suit arrangement of furnace
Rectangular housing of shape and size to fit into boiler setting without breaking regular courses of brick
Secondary air flow, joining gas and primary air stream at point of their lowest velocity close to ignition zone

Ask for your copy of this handbook of boiler plant data!

NATURAL GAS EQUIPMENT INC.

PETROLEUM SECURITIES BUILDING, LOS ANGELES

ATCO BUILDING TULSA, OKLAHOMA

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WILGUS REGULATORS . . N. G. E. GAS BURNERS . .
LIQUID LEVEL CONTROLLERS, GAS LIFT CONTROL
ANUBIS DIFFERENTIAL PRESSURE RECORDERS

Natural Gas Equipment Inc.
Petroleum Securities Bldg.
Los Angeles, California

Send me (no charge) "21 Gas Burner Problems and Their Solution"

Name _____

Company _____

Address _____

"Western Gas, Dec. 1929"

"A Good Coating" says U.S. Bureau of Standards Engineer "Should"~

"A good coating should adhere tenaciously; be and remain watertight; be inert to soil and soil water; have a firm tight bond; stand handling and not cut through on the skids; be dry and not sticky; not be brittle nor easily bruise; be uniform without bubbles or pockets; be thick enough for durability; be free from dirt, dust and moisture."

From a published article by well known authority.

Check the requirements above and you'll find McEverlast pipe line protection meets them with advantages to boot! In addition to ordinary forms of corrosion it resists destructive electrolytic reactions by means of specially prepared electrolysis-proof coatings.

In most cases, coatings are applied cold as shown in the picture. In a bad soil, processed McEverlast Osnaburg wrap is applied and where conditions are at their worst, a hot coat is sometimes added. This gives a complete protection that cuts maintenance costs to a minimum.

Write for descriptive, illustrated booklet.

McEVERLAST, INC.
[T.M.REG.]

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Publication Office, 124 West Fourth Street
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THIS TRADE MARK

IDENTIFIES KLIXON PRODUCTS

All Safety Pilots Are Not KLIXONS

The KLIXON trade mark is cast into the bottom of every KLIXON safety pilot. It protects you against substitutes and assures you of snap action—simplicity and reliable performance.

KLIXON safety pilots are carried in stock for circulating tank heaters, gas refrigerators, gas ranges, Barber burners and other gas appliances.

KLIXON safety pilots also are manufactured for special applications. If you will furnish specifications, we will gladly submit estimates.

Have you received your copy of our latest bulletin, "The Story of the Million Dollar Thermostat"? If not, the coupon below will serve to bring you a copy immediately.

SPENCER THERMOSTAT CO.

Please Send "The Story of the Million Dollar Thermostat."

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WESTERN GAS

"Reg. U. S. Pat. Off."

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

SAN FRANCISCO LOS ANGELES DALLAS

Why Gas Companies Advertise

The Utility's Commodities Are Under-Advertised; No Consideration Should Prevent the Full Use of All Modern Sales Agencies

By WILLIAM H. HODGE

Vice-president, Byllesby Engineering and Management Corporation, Chicago, Illinois.

IT is surprising that in our advanced era of marketing, the utility is forced to defend its use of advertising. Mr. Hodge brands the accusation that utility advertising is used to insidiously influence editorial opinion as a flagrant misrepresentation, and he brings indisputable proof that utility advertising is directed at exactly the same objectives as those sought by other commodity elements — larger volume sales and lower unit costs. Mr. Hodge delivered his remarks before the Publicity and Advertising Section of the American Gas Association at the October convention.—EDITOR.

William H. Hodge

IF ANYONE is interested in developing the market for almost any product in this day and age, neglect of advertising is nothing short of folly.

The notion that advertising adds to the price of a product is still a persistent one. The sophistry that utility companies advertise in the newspapers to insidiously influence editorial opinion is still advanced by those anxious to tear down these industries. Both are fallacies and as fallacies should be attacked at every opportunity.

It is common knowledge that the lowest priced articles in respective classes are the ones most largely advertised. Whether it is soap, shoes, automobiles or gas, this is generally true. Mass production of sales *must* use advertising. It is a contrast between popular and class appeal. Compare the Chevrolet and the Rolls-Royce.

About the second example of mass production in the modern world was the gas industry. The first was water supply. In the gas plant the engineers assembled in one place operations replacing the activities formerly isolated in homes, stores and factories. With the aid of distribution systems they substituted the results of mass production for the results of individual production.

The economic principle was sound simply because increasing volume of production and greater use of the investment over more hours per day and days per year progressively brought about lower costs of production per cubic foot of gas. If the rule had been the other way the gas business would not have flourished and its step-child, the electricity supply industry, never would have started. These two industries showed the way to modern industrialists, such as Mr. Ford. They paved the way for what has become known as the great American principle of industrialism.

All this being true, and it being granted that mass production and distribution are absolutely vital both to the widest possible extension of the service and the progressive lowering of cost and price, how can it be contended that gas and electric companies should not advertise? Here is a situation directly and seriously affecting at least 65 per cent of the people of this country wherein the success of mass distribution is dependent upon the success of mass appeal.

Of course, the desire to have such a discussion on the program of the A.G.A. Publicity and Advertising section does not come from within the industry but is the outgrowth of the efforts of certain newspapers, to make it appear that the advertising expenditures of the utilities are largely in the nature of bribes for the purpose of securing favorable treatment from newspaper publishers and editors.

These misrepresentations are a challenge, not only to the utility managers but to the integrity of newspaper publishers and editors. They are serious but they are not true. Such charges rest on nothing more substantial than suggestions from individuals connected with utilities that more advertising should be

done, coupled with the opinion that such a course would help toward better editorial opinion. Also upon a few foolish letters and remarks by men speaking their own thoughts, and not representative of any substantial part of the whole industry.

Measured against the facts as they exist and against the reputable part played by skillful advertising in developing the utilities with unprecedented rapidity, the so-called evidence on which these attacks are based is something less than inconsequential. It is in fact puerile, and this is why I say that some newspapers have set up a picture so distorted and false that it is entitled to no standing at all.

Advertising Must Carry On

The demagogues devoting themselves to the utilities would like to have every editor feel that his readers believed him bought if his paper carried gas or electric company advertising. They would cheerfully deprive these industries of the right to advertise at all, if they dared to propose such a thing. Meanwhile they sow what suspicion they can in the hopes that the utilities will be discouraged from advertising, and the publishers will be afraid to solicit such business.

Tactics of this character are powerless against integrity and backbone, and neither the newspaper publisher nor the utility managers of this country are conspicuously deficient in these particulars. While the immediate effect has been to retard utilities advertising, in my opinion, in the long run it will have no appreciable effect upon the effort of the utilities to employ advertising to the best economic advantage.

According to information supplied by the secretary of the American Gas Association's Publicity and Advertising Section, Howard F. Weeks, careful estimates show that approximately $2,500,000 was spent for gas company advertising in the year 1928. This represented a percentage of 0.6 of the total gross operating revenues of the industry. The amount spent for advertising space in the newspapers is estimated at about $1,400,000 or 56 per cent of the total advertising expenditures. There are about 14,500 newspapers in the United States. Assuming that only half of them are published in gas company territory this would mean an annual advertising expenditure of $190, which seems a pretty low price for the alleged sale of editorial integrity.

It may be interesting to compare the advertising expenditures of the electric light and power companies with those of the gas industry. Estimates which I have made indicate that the total advertising expenditures of electric light and power companies in 1928 amounted to about $13,000,000, or 0.68 per cent of the gross revenues. You will observe that this percentage of gross revenues is only 0.08 per cent greater than the percentage spent by the gas companies. In other words, the two industries are not far apart in relative advertising effort.

The proportion of total advertising spent by the electric light and power companies for newspaper advertising space was about $8,400,000 or 64 per cent of the whole. The remainder went for direct-by-mail, outdoor, poster, radio and other mediums of advertising. In the gas business it would appear that about 53 per cent of advertising expenditures is for merchandising appliances, while in the electric industry about 44 per cent is spent for this purpose.

The fact that a large part of both gas and electric advertising is done through mediums other than newspapers in itself shows how these industries regard advertising effort as a necessity in building up the business. No one would consider the employment of outdoor advertising an effort to bribe the outdoor advertising industry, or the use of direct-by-mail advertising as an attempt to corrupt the Post Office Department.

The total of both gas and electric advertising in the newspapers of the United States in 1928—an estimated sum of $9,800,000—is a long ways short of the $38,000,000 which it was charged the electric industry proposed to spend over the period of one year for the alleged purpose of "influencing editorial opinion."

Legitimate Influence

There is one way that utilities advertising may influence editorial opinion in a most legitimate manner. That is by the influence of the facts themselves in the advertising, aided by the manner in which they are presented. The object of all advertising is to have an influence on the minds of people, and if the advertising itself is honest, there can be no more harm in the conviction it carries to the editor's mind, than its appeal to any other mind.

It is interesting to compare the percentage of gross operating revenues spent for advertising by the gas and electric utilities with those of various other industries. Figures compiled by the Dartnell Corporation, a statistical and reporting agency, for the year 1928, afford this comparison. The following percentages compare with 0.6 for the gas industry and 0.68 for the electric light and power industry, and are as follows:

Percentage of Gross Sales Invested in Advertising by Various Industries

Auto Accessories	6.19%
Autos and Trucks	2.16
Building Materials	5.70
Cigar Manufacturers	7.60
Men's Clothing	2.25
Women's Clothing	3.10
Confectionery	5.87
Electrical Appliances	7.50
Financial	.58
Food Products	8.75
Furniture	4.70
Hardware	3.46
Jewelry	11.00
Laundry Equipment	8.27
Mail Order Houses	15.30
Paint and Varnish	2.81
Fountain Pens	12.55
Radio	7.30
Proprietory Medicines	27.25
Tires	2.04
Schools and Colleges	10.40
Toys	5.60
Wholesalers	2.19

Retail Groups

Department Stores	3.67
Grocery Stores	1.83
Drug Stores	2.76
Men's Furnishings	3.16
Hardware Stores	1.12
Furniture Stores	3.72
Lumber Dealers	.30
Shoe Stores	2.65
Jewelry Stores	3.10

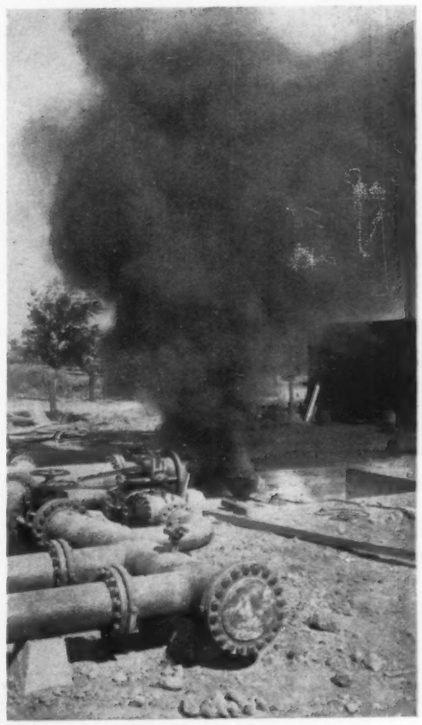
If there is anything wrong, morally or commercially, about gas company advertising today, it is simply its inadequacy. In other words, there is not enough of it being done. The industry can employ to advantage advertising in its various forms to a much greater extent than is the case at present. If this were done the pace of development would be accelerated, the maximum benefits of gas brought to many additional people in quicker time, and volume of output built up so that the price per unit of service could be more rapidly reduced.

We in the gas industry have nothing to fear from doctrinaires and demagogues if we look the situation squarely in the face and defend ourselves manfully and intelligently. We are playing a most important part in the welfare and progress of the nation, and if we continue to fairly fight our own battles with clean weapons, the public will not only treat us right but will applaud us.

Procedure for Cleaning *and* Testing *a* Natural Gas Line

By F. F. DOYLE

Manager Natural Gas Division
Pacific Gas and Electric Company



Blowing dirt from natural gas pipe line in cleaning operation, prior to putting Pacific Gas and Electric Company's first line in service to San Francisco Bay area.

UPON the completion of a pipe line, especially a long transmission line for natural gas, extending over a distance of many miles, there is usually a great amount of foreign matter in the pipe, such as sand, stones, rust, small particles of iron from welding, etc. The pipe, of course, is filled with air. Before putting the line in service, and also before testing, the air and foreign matter must be removed, which is best accomplished by blowing them out with high pressure gas obtained from the source of supply. In doing this, great care must be taken in order to avoid accidents and the following procedure is recommended:

F. F. Doyle

If possible, construction work on a long natural gas transmission line should be started at the end where the gas is to be received, or, in the case of a long line where several construction crews are to work at the same time, one section should be started at that end. If valves are placed at intervals of every four or five miles, the air, dirt, and other foreign matter can be blown from the pipe between valve locations as the work progresses, using high pressure gas for this purpose. Each section can also be subjected to the highest pressure to be carried on the system, so that as soon as the construction work on that portion is finished, it is ready to put in service.

The following procedure is recommended in the case of a long line completed, not cleaned, or which has not had the final test in any portion, and assuming that a telephone line follows the pipe line and that valves are in the line at least every five miles.

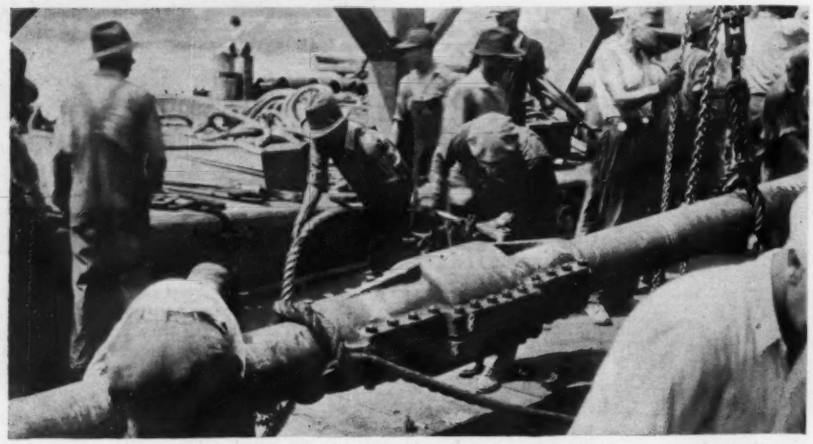
To start, the line should be left open at each valve location, or in sections not over 10 miles in length, and either raised out of the ground, or have a 45° elbow attached to the end of the open pipe to direct the dust, dirt, gas, etc., up in the air and not allow it to go into the other open end of line. If gate valves are used, lines should never be blown through them, as it ruins the seats and fills the space in the bottom of the valve for the discs with dirt. The line should be opened for blowing, ahead of gate valves, but for type valves, where the seat is not exposed to the dirt, etc., the line may be broken beyond the valves.

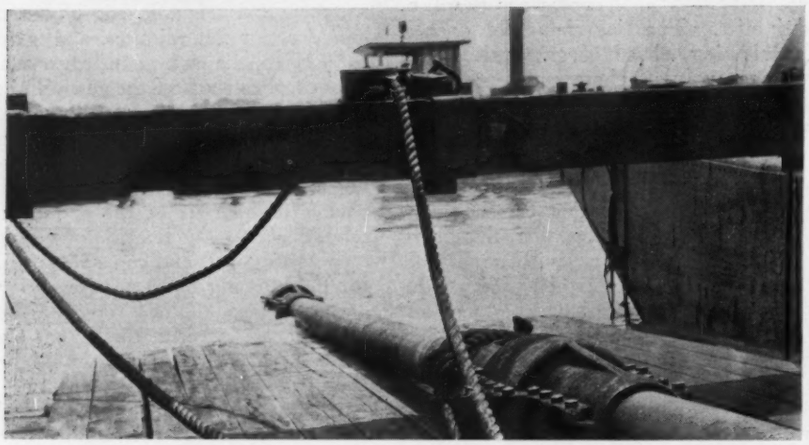
Two men should be stationed at the source of supply with a telephone, while at least two others with a car should be stationed at the first opening, five or 10 miles from the source, with a portable telephone, with at least 100 feet of duplex wire in order to have the telephone that distance from the noise. When ready, the men at the open end should notify those at the source who should start gas flowing into the line at as high rate as possible without moving small rocks or pieces of iron in the pipe. The maximum rate suggested is 25 miles per hour, which can readily be calculated by the use of the regular line flow formula using the observed pressure at the inlet end of the pipe and atmospheric pressure for the outlet end. This will drive out the air; if the gas should be turned in suddenly, at high velocity, the mixture of gas and air might be ignited from a rock rolling along the bottom of the pipe, causing an explosion. When plenty of gas is escaping from the open end, the men there can then telephone back for the full force to be given, which will blow out all foreign matter.

The escaping gas, dust, etc., can be watched and when it has blown *clean and dry*, for five minutes, and is apparently clean, the men at the source should be notified to shut off the gas. The man at that point should not allow the full pressure to flow into the line for a period of over 10 minutes; this prevents blowing for too long a period in case of telephone trouble. If at the end of a 10-minute period the line is not clean, the men at the open end can telephone back for the blowing to be continued for 10-minute periods until clean. Before blowing, all lanterns, torches, or fires in the path of escaping gas should be extinguished. The men should not have any matches on their person and *no smoking* should be tolerated. The gas should not be allowed to blow up into wires or trees. The direction of the wind should be noted and the gas so directed that it will not blow across highways or railroad tracks. Men operating the valves and telephone should stand in such a position while the line is blowing, that they are *not in the path of the escaping gas.* This is *extremely important.* No automotive equipment should be operated near the open end during the blowing of the line, nor should any vehicle be allowed to pass that point along a highway.

After the valve at the source of supply

(Continued on Page 86)





ABOVE: Scene on the Mississippi River. Four multiple lines of 10¾-inch diameter cross the Father of Waters on the newly constructed line of the Mississippi River Fuel Corporation. CENTER: Installing river clamp on pipe for a river crossing. BELOW: Line entering the Mississippi River.

526-Mile *to* Serve

Monroe--St. Louis Rivers; Is

By R. W. MILLER

THE officials of the Mississippi River Fuel Corporation have announced that their main pipe line system to carry natural gas from the Richland and Monroe fields in Louisiana to the St. Louis district, in addition to their distribution lines within the latter area, has been completed. Testing work on the southern portion of this line has been concluded for some little time, and at this date, the northern section having likewise undergone final pressure tests, natural gas is ready for consumption for the first time in and around St. Louis. Exceptionally good progress has been made in the laying of this pipe line in only six and one-half months from the time the work was commenced in April of this year. In this period, not only has the main line been finished, but in addition the main branch lines, industrial lines to various customers' plant sites and five compressing stations as well, including the installation of regulating devices, orifice meter layouts and in some cases gas burning equipment. The completion of this program makes natural gas available to industrial users in St. Louis, Missouri, proper, as well as to industrial plants in Crystal City, Missouri, and East St. Louis, Granite City and Alton, Illinois. If within reach of the main line, other industrial consumers in various cities and towns of Louisiana, Arkansas and Missouri will be served.

The pipe line system of the Mississippi River Fuel Corporation may be divided into three parts. These are: first, the main line; second, the line from the Richland gas field to the field compressing station in the Monroe gas field near Perryville, Louisiana; and third, the two branching main lines on either side of the Mississippi River in the St. Louis district. The main line, 431 miles in length, extending from near Perryville, Louisiana, to a point just north of the Meramec River in St. Louis County, Missouri, is constructed entirely of 22-inch outside diameter steel pipe. This pipe, for 300 miles, is electric welded longitudinally in 40-foot lengths, and of 5/16-inch thickness. The balance of the pipe is lapweld, in 19-foot lengths, and partly of ⅜-inch and partly of 11/32-inch thickness. The most southerly pipe line extends 25 miles from near Alto, Richland Parish, Louisiana to Perryville, Louisiana, and is of 16-inch outside diameter pipe, which is designed to carry gas under its own pressure from its origin in the Richland field

System Now Ready St. Louis Industry

22-Inch Line Crosses 8 Principal Completed in 6½ Months

Mississippi River Fuel Corporation.

to the field station at Perryville. Couplings of the Dresser type were used on this work. The two branch lines, commencing at the northern end of the main line, are constructed partly of 22-inch and partly of lesser diameter pipe down to 8-inch outside diameter. One of these branches leads into the St. Louis area, and the second, crossing the Mississippi River near the Jefferson Barracks, passes through East St. Louis and Granite City, terminating at Alton, Illinois. The total distance traversed by the two branch lines is 70 miles. Excluding industrial lines to customers' plants, there are 526 miles in the entire system. The capacity of the system in its original construction is 100,000,000 cubic fieet daily.

Map of the territory traversed by the 526-mile Mississippi River Fuel Corporation line from the Monroe fields to St. Louis.

The usual engineering practices have been followed in the laying of the pipe line. Due to the low lying territory along the southern portion of the line, considerable care has been taken to apply a protective coating to prevent corrosion, some 310 miles of the line having been thus treated. Block or section gates, with by-passes, have been provided every 8 or 9 miles. More than an ordinary effort has been made to choose a right-of-way for the main line that would be readily accessible to the usual lines of communication. United States Highways 61 and 67 parallel the pipe line for a great percentage of the distance between Perryville, Louisiana and St. Louis, Missouri. By such an arrangement, should necessity arise, it will be relatively simple for the maintenance crews to be soon on the job. To expedite such work, five trucks, with trailers, capable of transporting three joints of 22-inch pipe, with necessary tools and fittings, have been provided, and will be stationed at strategic equi-distant locations up and down the line.

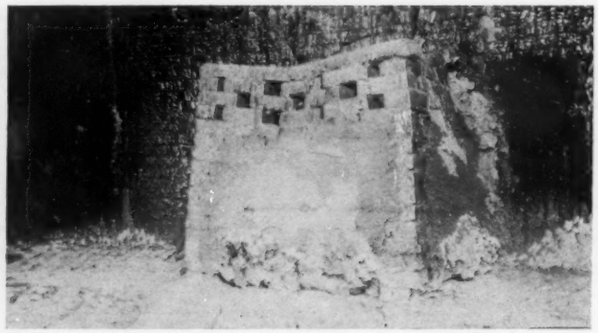
Possibly the most difficult problem encountered in laying the main line has been that of river and creek crossings. Other lines have laid in this country in a generally south-to-north direction, but no one of them has been in such close proximity for its entire length to the Mississippi River as has this line of the Mississippi River Fuel Corporation. The drainage from all of the northern and south central states between the Alleghenny Mountains in the east and the Rockies in the west, finds its way into the valleys through which this line passes. The line crosses no less than eight principal rivers, 10 creeks and bayous, and numerous swamps and other bodies of water. For the larger rivers, creeks and bayous, multiple lines were an absolute necessity. Four such multiple lines, of 10¾-inch outside diameter, cross the Mississippi River, and six each pass through the Arkansas, Little Red, White, South Black, North Black, St. Francis and Meramec Rivers. Each river line carries a gate at either end, before tying in again to the main line by means of a suitable header. The usual standard methods and equipment were employed in making these river crossings, the pipe being screwed together, and fitted at each collar with collar leak clamps and river clamps before being lowered. On number three line across the Mississippi River, it is believed that a record for any one day's work has been established, in that 108 joints of 10¾-inch pipe were coupled, clamped and lowered in 24 hours.

Due to the low lying territory along portions of the line, unusual construction problems were met.

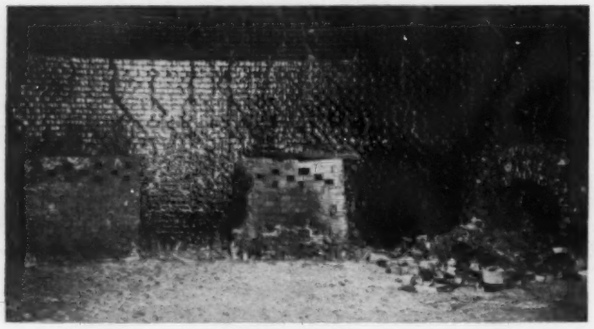
The contract for construction work on the 22-inch main line and the 25-mile extension to the Richland gas field was let by the Mississippi River Fuel Corporation, to Ford, Bacon & Davis, Inc. They in turn sublet the river crossing installations, southern half of the main line and the line to Richland gas field to Williams Brothers, and the northern part of the main line to the Okla-

(Continued on Page 58)

Flue construction in round down-draft kiln.



A "bag wall"—excellent for trying out refractory materials.



Showing heat action on two kinds of fire brick.

Interior of kiln after patching.

Burning Refractory Materials *with* Natural Gas

By LEE HOLTZ

General Superintendent, Manufacture and Distribution, Southern California Gas Company

THIS is the ninth in a series of valuable articles Mr. Holtz has presented to readers of *Western Gas*, dealing with individual branches of the ceramic industry in which natural gas performs an efficient fuel service. These discussions are a happy combination of technical information and general background on the industries in question, and no gas man concerned with the upbuilding of industrial load should miss reading them.—*Editor.*

TO the commercial world there is no other branch of the ceramic industry so important as the refractory division. There are indeed very few, if any, industries which are not directly dependent in some way or another upon clay products, and every improvement in the quality of refractory materials must be followed by advances in many of the dependent industries.

The term "refractory" is perhaps universally accepted in the ceramic industry as meaning a brick or some special shape which has been fired to impart to it certain predetermined qualities, and which is capable of satisfactorily maintaining these qualities under service conditions, the primary condition being an elevated temperature usually above "red heat" (566° Cent. or 1050° Fahr.). To remain within the keeping of this definition it is therefore essential that a refractory body be fired in such a manner as to make it suitable for the services required, which are many and varied; and furthermore, it should be capable of maintaining the qualities acquired during the firing, while in service.

The uses for refractory materials are so many and the requirements so varied, it will be impossible in the space allowed for this article to go into much detail. However, this point is of such interest that it should at least be touched upon before taking up the subject of manufacturing and burning.

Furnaces used for heating forgings and metal shapes are operated under widely varying conditions, so that no specifications on refractory lining materials can be applied universally. In some cases the temperatures are quite low and ordinary grades of fire brick give long service. In others the brick used for linings are destroyed in a few weeks' time.

The most severe service on refractories is found in furnaces used for heating iron stock to welding temperatures. Here the flame is often hot enough to cause fusion and dripping of the roof brick, and the oxide scale on the metal melts and runs down on the hearth where it collects and erodes the bottom and side wall brick. Erosion may also come about from welding fluxes used on the metal parts.

Undoubtedly the most severe test that can be put to a furnace lining is occas-

ioned when the furnace is operating at high temperatures during the day and is shut down during the night, causing spalling on the roof and side walls. Ordinary fire clay brick will not stand this treatment for a very long period.

Another cause for short life lining in forging furnaces is the placing of the furnace near large drop hammers, which cause enough vibration to shake the bricks apart.

In all industrial furnaces and boiler fire boxes, the best selection of refractory materials to meet the conditions described can only be determined by repeated trials, and the more one can know about the properties of the available materials, the more the tests can be reduced to a minimum. It must be understood that all of the desirable properties cannot be obtained in any one material. Therefore, it becomes necessary in some cases to resort to the use of two or more refractories in the same furnace.

Fire clay bricks are well adapted to forge and some heating furnaces where temperatures are moderate; they will give satisfactory results when used at temperatures and under conditions for which they are recommended, but will be subjected to shrinkage and spalling if the temperatures are exceeded.

For high temperature work there are many bodies, such as chrome, sillimanite, diaspore, kaolin and others, that have their peculiar characteristics making them adaptable for certain requirements. Then there is the plastic refractory material containing raw ground clay, calcined flint clay, crushed fire brick and sometimes ganister or silica rock. This material is economical to use because it is easy to install and odd shapes can readily be repaired or rebuilt.

Proceeding to the manufacturing phase, the clay materials forming the body of the refractory are prepared much in the same manner as other clay products, except, of course, that the materials are of special nature to withstand high temperatures.

In making ordinary fire brick, the clay mixed with "grog" is molded into the required shape and fired at a temperature between 1200° Cent. (2192°F.) and 1300° Cent. (2372°F.). Some silica wares are fired to 1460° Cent. (2660°F.) and even higher.

Fire clays usually contain between 1 per cent and 3 per cent of alkalies, iron oxide and some lime, which suffice for sintering during firing.

Refractories must be fired at a temperature high enough to prevent their fusing under working conditions, which means a temperature high enough to prevent their exhibiting an appreciable residual contraction under working conditions; otherwise cracks, etc., may be developed. The more compact and close grained the brick, the longer its working life.

TYPES OF KILNS

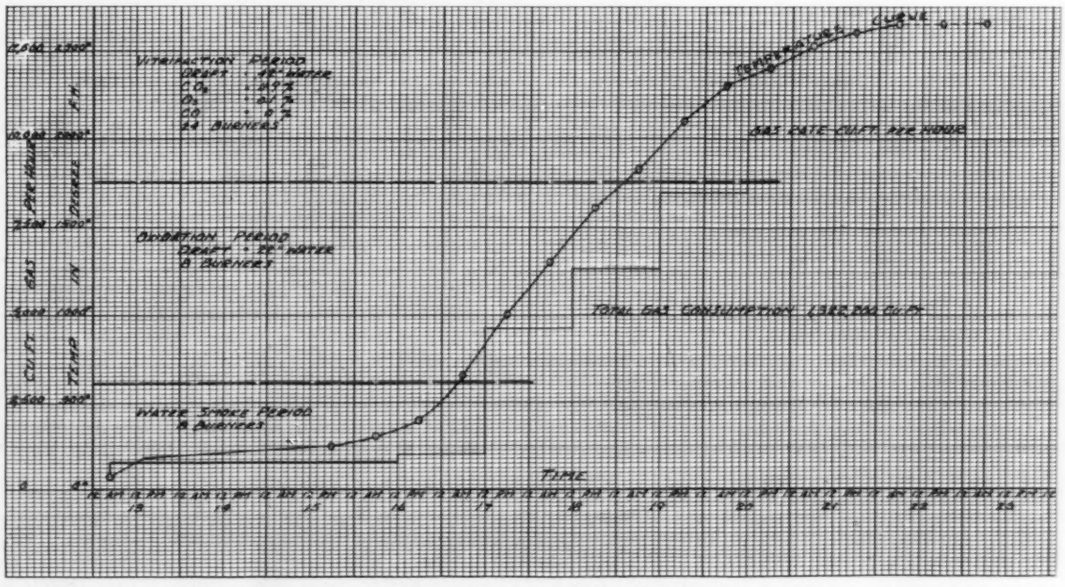
The ware is fired in round down-draft, up-draft and tunnel kilns, but rarely in the muffle type. However, much has been said in previous articles regarding this phase, so let us pass on to say that low pressure air and gas burners as well as the atmospheric type are used, depending on the nature of the product and type of kiln, and that both types are found to give successful operation.

The writer has recommended the changing from atmospheric burners to low pressure air and gas burners, which has resulted in marked economy insofar as gas consumption is concerned, which in turn has produced a much improved article over the previous type of burner. Rarely has there ever been a case where low pressure air and gas burners were changed to atmospheric, that any improvement has been experienced. Low pressure burners have proven to be the more flexible for operating in the average type of kiln. The air and gas can be mixed more intimately near the nozzle of the burner and combustion can be kept within the fire box and bag walls.

In one test conducted in a plant manufacturing very high grade refractory, a round down-draft kiln was used, burning approximately 75 tons of fire brick and firing to a temperature of 2500° Fahr. in 142 hours' time, of which 67 hours were for water smoking. At the time the test was run, a pressure of 8 pounds was found to be necessary on the house line system due to the fact that the consumption was large and the piping inadequate in size. Taking the kiln as it was operating, it was found that it required approximately 8000 cubic feet of 1060 B.t.u. gas to burn 1 ton of ware.

A flue gas analysis was made during the high firing period and the analysis showed considerable CO and about 2 per cent excess air. The atmospheric burners were inadequate in size and were being forced, which meant that the

(Continued on Page 60)



Silica brick—round down-draft kilns of 50,000 brick capacity—2-inch atmospheric burners. Test by Industrial Service Department, Southern California Gas Company

Consumers Accounting and Collections for Small Communities

By L. L. DYER

Comptroller
Lone Star Gas Company

Form 1073—2M—3-30

SALES AUDIT SHEET
AND
AGENT'S RECORD

Town_____ Month_____

ACCOUNT	METER READINGS		CHARGES		DATE PAID
	PRESENT	PREVIOUS	GROSS	NET	

Two copies of the "Sales Audit Sheet" are kept—one in the central office, one in the district office. The sheet is of 8½x11-inch size.

MACHINE billing and ledger recording has long been recognized as the most practical and efficient method available for larger cities, but only in the last few years has any thought been devoted to the idea of applying machine compilations to small cities and villages. Possibly this has come about through the development program of utility concerns, who, only a few years ago, could see no great earning to be derived from the smaller units of operation. As operations have progressed to the point that practically every large utility is serving a number of small towns and hamlets, hand-compiled records have become burdensome, and the necessity for efficiencies and economies in accounting for sales and accounts receivable from customers at such points has been obvious.

L. L. Dyer

Developments in this respect have gone forward very rapidly, until at this time, most large utilities have very workable plans along this line, and while there are variations as between the detailed application of methods, the principles involved have become surprisingly standardized.

All machine billing systems contemplate the compilation of the consumer's bill by machine and, with the same motion, creating some kind of office record by consumers and accumulating in the machine totals of the billing for the purposes of recording gas sales.

The "Sales Audit Sheet" or "Customer's Register" plan seems to be the most popular, and is, indeed, probably the most workable system available for the handling of groups of towns up to 18,000 or 20,000 consumers under the central billing machine plan.

The Lone Star Gas Company uses the sales audit sheet plan in the central billing of towns embraced in the system of the Community Natural Gas Company, its subsidiary. Approximately 200 towns in Texas and Oklahoma make up this system, and the number of consumers per town range from 25 to 14,000. The 200 towns have a total of approximately 60,000 consumers.

The first thing necessary under the system we refer to is the grouping for accounting purposes, of a number of small towns. In some cases, this grouping is unnecessary or impracticable, since towns may be widely scattered, or a so-called "group" may consist of only one good sized town. For the purposes of this article, however, we use the term group as applied in either sense.

Some means must be provided in the small towns for the customer to apply for gas, post a deposit, and apply for

(Continued on Page 64)

Form 1036—10M Sets—3-29

_____ GAS COMPANY

DAILY CASH REPORT

_____ District _____ Date _____, 19____ Report Number _____

	TOWN	NAME OF BANK	Deposited Amount	DISTRIBUTION					Miscel. Receipts	
				Customers' Security Deposits	Accounts Receivable: Net Domestic xGas	Accounts Receivable: Industrial *Gas	Accounts Receivable: xx Merchandise	Penalties and Forfeited Discounts	Explanation	Amt
			$	$	$	$	$	$		
		TOTALS ,	$	$	$	$	$	$		

COMMERCIAL DEPT.	CORRECT:	APPROVED:	GEN'L CASH BOOK
Checked_____	_____ District Cashier	_____ Cons. Dept.	Checked_____
Ind. A/C Rec. Posted_____			Entered_____

NOTE:—x Stubs on Domestic Collections must agree with totals. xx Mdse. Collection Stubs must be in agreement with total Mdse. Collections. *List Name, Town and Amount of each Industrial Account collected on back of this Report **without fail,** also show Domestic Gas Collections and Penalties and Forfeited Discounts by towns on back in spaces provided.

District office collections are reported to the central office on a "Daily Cash Report" form, shown above. On the reverse side are two forms, for reporting detail of "Industrial Gas Accounts Collections," and of "Domestic Gas and Penalties and Discounts Collections."

Holiday Display AMONG the gas company window and floor displays which have taken the eye of a fanciful public in past holiday seasons, *Western Gas* considers those above to be representative of good treatment. It will be noted that they cover a general range, from straight gas appliance sales messages (Nos. 1, 4, 5, 6) to formal and effective institutional window "copy" (No. 2). Of equal interest is the "securities for Christmas gifts" window (No. 3). The Public Service Company of Colorado, Denver, Colo., contributes No. 1; Laclede Gas Light Company, St. Louis, Mo., No. 2; Spokane Gas & Fuel Company, Spokane, Wash., Nos. 3 and 4; Portland Gas & Coke Company, Portland, Ore., Nos. 5 and 6. ¶ Christmas, 1929, calls for a display in the modern mode, in every utility office.

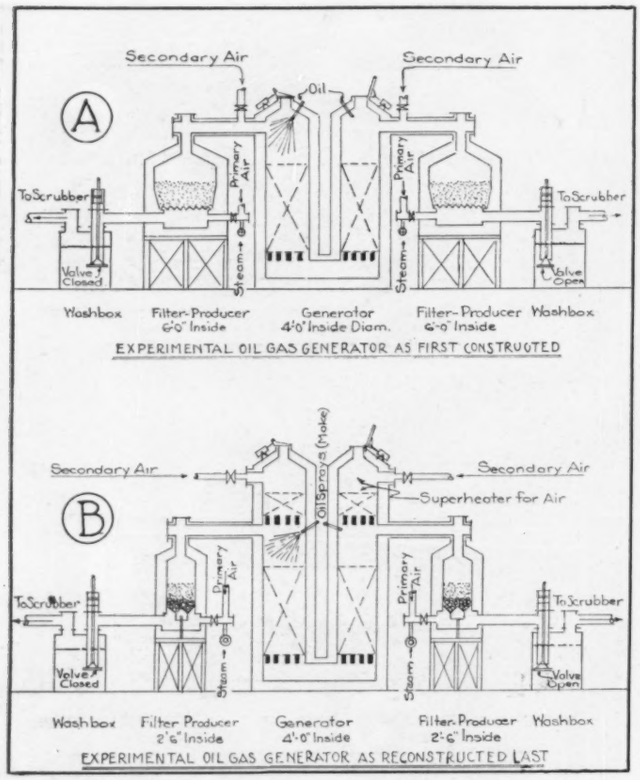


PLATE 1:
Experimental steps in the development of generator.

Added Efficiency Oil

By-Product Elimination

By LEON B. JONES

THE history of development and invention in most industries or lines of endeavor, records spasmodic periods of intensive activity and progress rather than a steady consistent advancement. The gas industry is no exception, and in the century since gas was first put to practical use, periodically the several production methods have each made great strides forward, and then rested on their laurels.

Coal gas practice for many years followed serenely in the footsteps of the previous generation until water gas threatened to supplant it as a production method. Today the modern ovens and continuous verticals are a marvel of efficiency and a far cry from the old benches that so long held sway.

Water gas from its very inception filled a long felt want and, once the prejudice and propaganda of the coal gas man was overcome, occupied an ever increasing place of importance until most of the manufactured gas produced was water gas. For more than 40 years apparatus of practically the original design was referred to as "standard" and not until quite recently have any important improvements been made in this method of manufacture. The necessity of using low grade fuels in certain localities brought about the major development which was the incentive to the intensive activity which has modernized water gas practice in the last few years.

Oil gas was conceived as a method of production a great many years before oil was available to permit its commercial application, but since the development of the Western oil fields oil gas has been the only logical method of gas production in this section. Cheap oil, no local oil and no coke market created this condition, which still maintains. Cheap oil, however, while the important factor in creating oil gas as a commercial process, did not contribute to the improvement or development of oil gas as an efficient process. Oil was so cheap that even the inefficient apparatus in early use showed comparatively economical production costs, and for many years no effort was made to reduce the oil usage or increase the efficiency of oil gas production.

Leon B. Jones

From its very inception, and to the present time, without doubt the biggest problem in connection with oil gas manufacture has been the utilization or disposal of the solid carbonaceous by-product lampblack. The enormous quantities of this material produced by the early forms of generating apparatus forced the various utilities to immediately seek an outlet. Other than as a fuel, lampblack has never had any commercial value and because of the expense involved in its separation and drying and inefficient utilization, the net fuel value is practically nil. Most companies have, however, used lampblack as boiler fuel, but more as a means of incineration and disposal than because of any economy effected.

In the larger properties it was impossible to dispose of more than a part of the lampblack produced as boiler fuel, and in the Northwest and in southern California the excess was dried and sold as domestic fuel. Lampblack has some merit as a domestic fuel, and there are those who still contend that their early decision was not an expedient but was well founded, and that it was economically sound for a gas company to produce and market a competitive fuel. However, the lampblack had to be disposed of and this was the means selected by some of the oil gas companies.

Diametrically opposed to these views, the companies in central California pioneered at that early date the modern slogan, "It can be done better with gas", and, with a determination to stay strictly in the gas business, converted their surplus lampblack into carburetted water gas.

At first, dried and briquetted, and later used air-dried from the pile, lampblack made a good grade of blue water gas which was enriched in checkerless carburetors with the same heavy oil used in the oil gas operations. Thus, by the use of two separate processes, all of the oil was ultimately converted into gas and the lampblack disposed of. The duplication of equipment, however, resulted in a considerable increase in investment per unit of capacity and the operation of both water gas and oil gas generators, together with the handling

in Production of Gas

Effected *by* New Process

President
Jones Gas Process Corporation

of lampblack, materially increased production costs.

Much was learned from making blue water gas from lampblack and from carburetting with heavy oil that was applicable to the cracking of oil at higher temperatures in an oil gas generator, and stimulated by an increasing cost of oil, a definite program was initiated about 1910 to improve oil gas production efficiency. These efforts were primarily directed to combining into one operation and in one process the results then being obtained by the combination of oil gas and water gas apparatus.

After several years of experimentation, by applying the catalysing effect of hydrogen and highly super-heated steam on the cracking of heavy oils, a new and improved process was developed. The process developed at that time, and which has been in such general and successful use since, decomposed a considerable quantity of steam coincident with the oil cracking, combining a much greater proportion of oil carbon as water gas. Oil usage was reduced approximately 25 per cent and the lampblack by-product was reduced to an amount just sufficient to supply boiler fuel for average gas works steam requirements. This process soon replaced most of the older forms of apparatus and made the production of lampblack water gas to dispose of surplus by-product unnecessary.

Firing steam boilers with lampblack is at best a dirty and inefficient operation and the additional labor necessary in handling and firing is approximately equal to the cost of oil fuel for an equal amount of steam evaporation. All that can be said in its favor is that it has disposed of the lampblack and the steam just paid for the disposal.

*A paper presented before the Technical Section of Pacific Coast Gas Association at Del Monte, California, September 13, 1929.

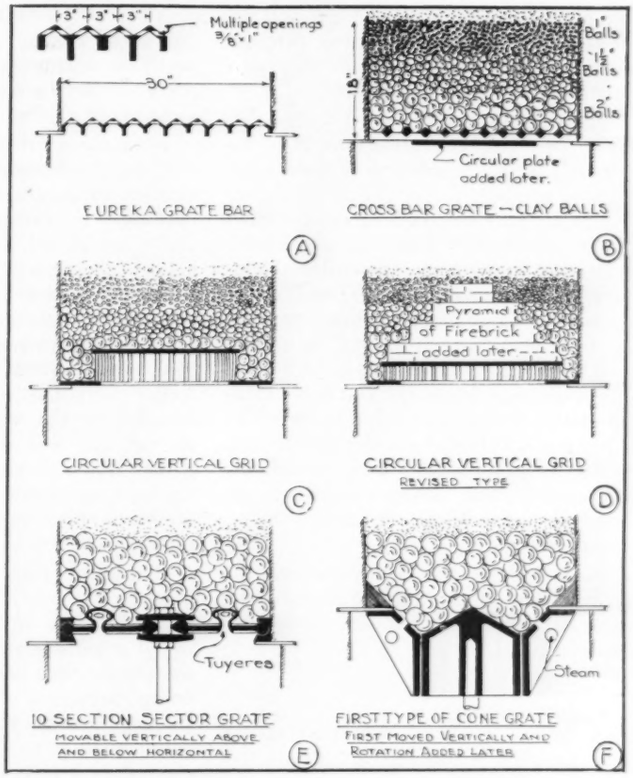


PLATE 2:
Diagram showing progressive development of grate.

As long as lampblack provided sufficient boiler fuel with no excess and no other fuel necessary, a gas making process that would reduce the lampblack production by less than its complete elimination has seemed a very questionable improvement, necessitating the use of oil as well as lampblcak for boiler fuel and in an amount probably equalling any oil economy effected in gas generation.

NEW PROCESS

A process has now been developed by which a commercial gas can be efficiently made from heavy fuel oil and without any by-product to dispose of. The process is extremely simple, combining in a unique way three well known principles of gas manufacture.

The development of the new process originated with a complete reversal of ideas previously entertained regarding lampblack formation incident to oil cracking and its combination with dissociated steam to form water gas. Previously, efforts had been directed to an endeavor to create an ideal atmosphere within the checkerwork and chambers of an oil gas set, and, by the use of catalysis and highly superheated steam, to prevent an excessive formation of carbon as a result of oil cracking and so stimulate the water gas reaction as to combine all of the carbon unavoidably liberated with dissociated steam to form water gas.

While oil carbon is chemically ideal for combination with dissociated steam, it has long been recognized by those closely associated with oil gas operations that carbon released from a hydrogen bond and not instantly combined with oxygen, is very apt to reach the washbox as by-product lampblack, rather than the holder as water gas. Liberated carbon travelling in the gas stream is not the principal source of water gas formed in an oil gas set, but rather the carbon deposited from previous runs and subsequently blasted to incandescence. The only reasonable explanation of this condition seems to be that the flocculent carbon is not really incandescent and therefore does not offer a greater affinity to the oxygen than does the hydrogen-oxygen bond of steam.

The new line of thought accepted as unavoidable the liberation of a considerable amount of uncombined carbon, incident to cracking oil to the desired proportion of hydrocarbon gases. Its appearance as by-product lampblack, however, is avoidable and in the new process is all retained within the apparatus and used in subsequent runs to make producer gas and water gas.

This is best accomplished by constructing an apparatus that is completely reversible, preferably of four shells, the two central shells being the oil gas generators connected together at the base and each fitted with a stack valve

and blast connection on the top and an off-take on the side connecting through a crossover pipe to the top of the additional shells or filter-producers.

These filter-producers, so called because their combined function is to alternately filter lampblack from the oil gas and produce water gas, are relatively smaller in diameter and shorter than the oil gas shells. They are fitted with grates to support the deposited lampback, below which the air and steam connections and a gas offtake connecting through a "dip-pipe valve" to a common or separate wash boxes. The end of the dip pipe forms the seat for a conical self-centering disc valve operated by a hydraulic cylinder on the offtake tee. Being cross-connected and completely submerged, these simple valves very effectively accomplish the complete reversal of the set.

Plate 1 shows the arrangement as described, and depicts the demonstrating unit as originally installed and later modified.

OPERATING CYCLE

A typical cycle of operation of the new process, assuming for descriptive purposes the four shells to be on the same axis east and west, would be as follows: Primary air (with or without admixture of steam) is introduced below the grates of the north filter producer. Combustion of the deposited carbon is supported and by maintaining the proper air velocity the temperature of the fuel bed is raised and a definite proportion of combustible producer gas is formed, passing through the crossover pipe to the north generator. Secondary air is admitted at the top of the north generator, is preheated in the superheater, meets and supports combustion of the producer gas in the make chamber of the north generator, the hot products passing down through the north checker, across and up through the south checker and finding egress to the atmosphere at the south stack valve.

With the north fuel bed incandescent and the checkerbrick at the desired gas making temperature, north primary and secondary air valves and the south stack valve are closed. Steam is introduced below the north grate passing up through the now incandescent fuel and the water gas thus formed passes through the cross-over pipe to the north generator. Simultaneously oil is injected into the north make chamber, cracked in the water gas atmosphere, the oil gas and water gas passing together down through the north and up through the south checker, through the crossover pipe to the south filter-producer.

The south fuel bed having been last used on the previous run for water gas is now below the critical temperature of oil gas dissociation and therefore acts as a mechanical filter bed, the lampblack being deposited thereon and the gas passing through to the ash pit and the south wash box. The lampblack as deposited in a layer on the surface of the filter bed is similar in characteristics to the material with which we have long been familiar as a by-product and contains considerable volatile matter. The passage of the hot gases through the deposited lampblack, distills and recovers a considerable part of the volatile matter and leaves the lampblack as coke for subsequent use.

At the completion of the make cycle, when the prescribed amount of oil has been introduced from the north, the dip pipe valves are reversed (the south being closed and the north opened); steam and then primary air are introduced below the south grate, purging the gas from the south filter-producer and in turn the south and north generator, the north stack valve being raised before any combustion products have passed to the north filter-producer and wash box. With the raising of the north stack the secondary air on the south generator is opened and the cycle proceeds from the south, completely reversing each function as above described.

LAMPBLACK UTILIZED

Oil gas then, is made in accordance with past practice and experience, but the lampblack instead of appearing as an almost useless by-product is retained within the apparatus and used to make producer gas, to take the place of heat oil and also to make a very considerable amount of water gas.

The utter simplicity of the scheme defies criticism and it was soon realized, after a few preliminary experiments, that the real problem in connection with the development of a commercial process would resolve itself largely into the elimination of mechanical difficulties.

DEMONSTRATION AT SAN DIEGO

Several years ago, in cooperation with the San Diego Consolidated Gas and Electric Company, an initial demonstration was undertaken to prove the fundamental principles involved. An existing lampblack water gas generator at the plant in San Diego was modified to permit oil gas to be made in the superheater and the lampblack separated on the fuel bed in the generator and subsequently used for producer gas and water gas generation.

This demonstration was highly successful and proved the theory to be entirely sound and practical, and, after several months of intermittent operation and further modification to the apparatus, it was decided to build a complete demonstrating unit. This unit (shown in Plate 1) which was to embody all of the features of the new process and incorporate the experiences of the preliminary work, was completed and placed in operation the latter part of June, 1928.

Following the first operations of the demonstrating unit for approximately three months the set was operating during the day shift only and for six days per week. This time was largely devoted to training a crew, eliminating minor mechanical difficulties and getting the feel of an entirely new apparatus, since which continuous 24-hour operation has been maintained.

Our problem was four-fold, and the major elements which had to be correlated were as follows:

(Continued on Page 67)

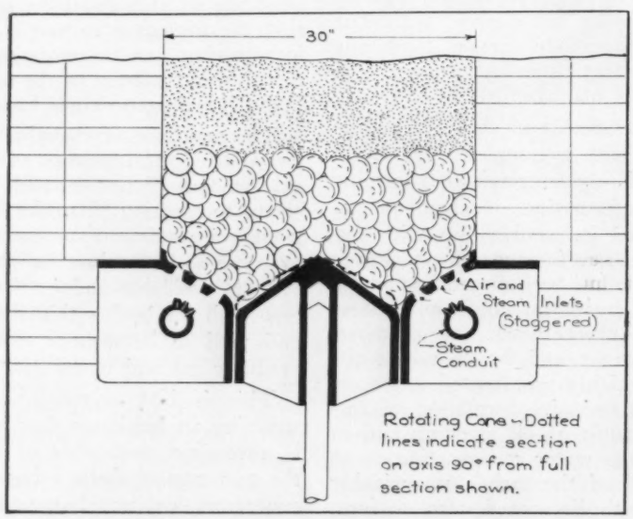
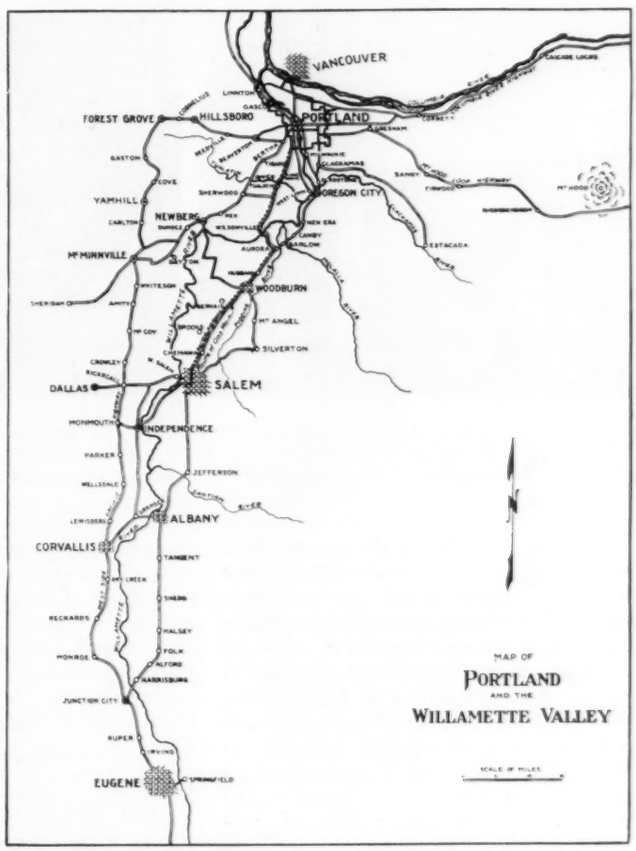

30"
Air and Steam Inlets (Staggered)
Steam Conduit
Rotating Cone – Dotted lines indicate section on axis 90° from full section shown.

Plate 3. Final development of rotary ball grate.

High Pressure Main Extension Program Links Oregon Cities

By R. E. COLE

Main and Service Construction Engineer
Portand Gas & Coke Company



AT RIGHT:

Dotted line shows route of Portland-Salem extension—also Willamette Valley communities which may later be reached by high-pressure mains of Portland Gas & Coke Company.

THE laying of almost 50 miles of main to transport 570 B.t.u. gas to Salem, Oregon, from the efficient oil gas plant of the Portland Gas & Coke Company, is a development more significant than might appear from the distances or line sizes involved—because it is the forerunner of extensions which will make Portland the hub of a gas system reaching into many of the prosperous centers of this northwestern section. This achievement bears further evidence to the economies inherent in long distance transmission of manufactured gas, for it was undertaken only after the most thorough analysis of all factors involved.

In extending its services to Salem and the communities en route, the Portland utility faced severe electric competition, and in addition had the problem of selling a public which was to a great extent unfamiliar with the advantages of modern gas usage. The situation called for quantities of the aggressive sales-mindedness for which the Portland Gas & Coke Company has a well deserved reputation.

Mr. Cole has here reviewed in some detail the economic considerations which governed his company's decision to extend mains to Salem from Portland. He discusses new business promotion, reviews the rate set-up adopted for domestic and industrial users, and describes the engineering procedure followed in the line construction.—*Editor.*

THE Portland Gas & Coke Company acquired by purchase, on August 1, 1929, the gas plant and properties of the Portland Electric Power Company in the city of Salem, Oregon. This is the second gas utility purchased since the present company was organized in 1910, the other having been the property at Vancouver, Washington.

Salem, a city of about 27,500 population, is situated 52 miles south of Portland, on the Pacific Highway, on the banks of the Willamette River and in the center of the beautiful and productive Willamette Valley. It is the county seat of Marion County and the capitol of the State of Oregon.

On the accompanying map will be noted the line route, terminating at Salem, and linking a number of smaller communities which either lie along the line or are being reached by extensions to the system. Among these latter towns are Woodburn, a community of 3,000 people, in the heart of a rich berry-raising district, and Chemawa, home of the Government Indian School, providing education in all lines of work to 300 Indian boys and 300 Indian girls, with 77 buildings comprising the school. Among the smaller towns, of 300 to 400 population, are Tualatin, Wilsonville, Aurora, Hubbard, Gervain, and Brooks. A well-rounded agriculture with related industries, forms the backbone of prosperity for these towns.

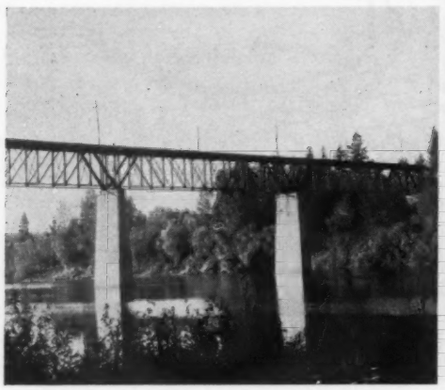
The Salem gas plant was owned and operated by the Portland Electric Power Company, manufacturing gas from coal with four benches of sixes and having a holder capacity of 100,000 cubic feet. The distribution system was designed originally for low pressure. This company also supplies electricity to the city and very little effort was made to secure gas customers, due principally to the fact that the business has not been profitable, showing a deficit during 1923 and 1927. The customer was required to pay for all main extensions and service. The money thus paid was credited to the customer's account, to be used up in two years. For this reason only 20 short main extensions were made from 1923 to 1928. Electric rates are the same as in Portland. Wood and coal prices are also comparable to Portland prices.

The gas rates were as follows:

First 10,000 cu. ft.	$2.00 per M.
Next 10,000 cu. ft.	1.90 per M.
Next 20,000 cu. ft.	1.80 per M.
Minimum charge	.75

The distribution system comprised 33 miles of main of varying size, 6-inch and under, and covered 35 per cent of the town. The number of gas customers on August 1, 1929, was 1,568 with a maximum daily demand of 80,000 cubic feet. The average domestic and industrial sales was 13,400 cubic feet per customer per month.

When the growth of Willamette Valley towns and communities and the foregoing conditions were considered, there was indicated a possible opportunity for the Portland Gas & Coke Company to purchase the Salem gas plant, supplying gas by means of high pressure from Portland, and, by obtaining additional business along the way and by increasing the gas consumption through price reduction and sales effort, make a profitable investment.



LEFT: Oregon Electric Railway Bridge spanning Willamette River at Wilsonville. CENTER: Construction on the Oregon Electric Bridge at Wilsonville; 8-inch pipe in place at extreme right. RIGHT: Ferry on Willamette River at Wilsonville. A few minutes before this picture was taken a 5-ton truck loaded with gravel backed off this ferry into 20 feet of water.

As stated previously the present low pressure gas system covers about 35 per cent of the area of the town. There are 6,057 dwellings and 608 other buildings within the city limits and 2,700 of the total are on the existing distribution system, with gas service in 1,800. This number comprises the business houses and close-in residences but does not include all of the large State institutions nor the moderate class of home in the suburbs. In the better class of residences in Salem, where gas has not been available, investments have been made in some electric equipment. However, a large percentage of domestic cooking and water heating is still available and the domestic, house heating, and refrigeration business will exceed our estimates.

Sales solicitation began on August 1, 1929, in the city of Salem; a house-to-house canvass of the buildings and residences on the present low pressure main system being made by a crew of five salesmen. For the first three weeks considerable difficulty was experienced in making sales. Modern gas equipment was not known or understood by the average housewife in Salem, as the sale of electric equipment had been pushed in preference to gas. Policies and rates had to be explained, articles and advertisements in the leading newspapers published, cooking schools and demonstrations held—in fact, every known agency used to break down the resistance to gas as a modern fuel.

The results have been most gratifying in the small territory which we have worked. From August 1 to September 30, 1929, there was sold the following equipment, amounting to over $12,184:

Ranges	72
Water Heaters	45
House Heating	17
Refrigerators	1
Miscellaneous	19

When conditions as they were are given due consideration, the showing made thus far is exceptional. Solicitation was begun at a very poor time of the year; fuel had been stored for the winter (or arrangements made for fuel delivery); a large number of customers were on vacations and people were not educated to the possibilities of gas in the home.

The electric company has placed a large sales crew in the field making a house-to-house canvass for electric business. When we begin the solicitation of all houses off the present mains, preaching the gospel that "gas is better", the results will astound electric men who believe that gas has ceased to be a competitor in cooking and water heating in the modern home. To those who feel that electric competition has the gas man on the run we say, "Get your war paint on!"

THE FARM LOAD

It is estimated that we will add over 4,200 new customers to our present distribution system. Farmers' wives along the route of the 10-inch and 8-inch main are making inquiries regarding gas service. Cooking over a red hot stove, for hungry men at harvest time, has ceased to be a pleasure for the housewife on the modern farm. She desires any modern convenience that will lighten the farm work. Listening in on the radio hour devoted to gas features has made the housewife on the

(Continued on Page 61)

Lining up, leveling and tacking crew in action on Salem line.

Showing 8-inch pipe on steel horses, with welders at work.

Selling Gas Boilers *in* Cooperation *with the* Heating Contractor

By WM. L. HOYT
*American Gas Products Corporation, San Francisco California**

WE all realize the tremendous field the gas fired boiler offers in obtaining a large heating load in the winter months as well as a steady consumption throughout the year when this equipment is used to supply hot water for the larger buildings. How best to obtain this desirable load is the subject of this discussion. In the paragraphs below a plan is set forth for obtaining it through the cooperation and help of those who have made boiler work their profession—the heating and piping contractors.

THE CONTRACTOR'S FUNCTION

Before we go further it will be well to analyze the position the heating contractor occupies in the gas company's territory. Primarily, he is looked upon as an authority in boiler heating and the type of fuel best suited to his customers' requirements. His experience is asked for and his advice taken in the large majority of heating installations. Secondly, he is held responsible for the correct installation and operation of the boiler system; going further, it is his responsibility to design the system as to boiler size, pipe size, radiator sizes, etc. Through his associations he is constantly striving to raise the standard of heating by the sale of quality installations. His profession is an old one and his methods of doing business are long established. As an example, you will rarely find a so called owner or list price published by manufacturers or jobbers of heating equipment; the only prices quoted are trade prices. The resale quotation is the contractors' exclusive privilege. It is the exception to find an active selling force maintained by a heating or piping company, the business being obtained through contacts with the general building contractor, architect, engineer and satisfied clients. In general, you will find the contractor recognized as the backbone of the boiler and radiator business the country over.

THREE MAIN PROBLEMS

From the above it may readily be seen that every boiler heating campaign revolves around the contractor. Without him a lasting and real success is practically impossible, but with his help and cooperation the results will be far reaching. The utility, wishing to develop the boiler field, is faced with the three main problems. First, an adequate sales force must be organized. Secondly, this force must be thoroughly trained in selling the advantages of gas fired boiler heating to customers. Thirdly, a plan of operation must be decided on that will allow the sales force to work at its maximum efficiency and with as little sales resistance as possible. We are all familiar with the first problem, so this will not be discussed. The next problem is also well known, but the manner of training depends to such an extent on the last problem—the working plan—that we will treat it first.

In the early days of utility boiler merchandising, the sales force shouldered the whole load of selling, engineering and installing. This necessitated a force of technically trained men with the installation being done by a favored contractor or by the utility service department. The boiler was sold direct to the owner. Boilers were sold, and all credit goes to these pioneers; but the selling was done under tremendous handicaps, with sales resistance high. In every case, the salesman ran against the antagonism of the heating and piping contractor, and the result was that a large majority of the installations were made in old homes—new home installations being exceedingly difficult to obtain. The heating contractor looked upon this method of selling as a direct encroachment upon his business, which is essentially a retailing of equipment and not a retailing of labor, to which the plan boils down. He did not participate in the profit on the boiler and controls, and as a consequence his whole effort was directed against gas.

Throughout the country the utility merchandising departments are now stressing dealer cooperation with the purpose of obtaining dealer help in putting gas and gas appliances in the homes, and their policies are being shaped to this end. One of the biggest phases of this movement is cooperation with the heating contractors, which is developing into one of the biggest partnerships in the gas industry.

A WORKING PARTNERSHIP

The contractor will welcome utility cooperation and the proper selling methods will give us his much needed help in selling against competitive fuels. To carry through such a plan, the utility must make itself a partner with the contractor in developing and selling the heating field that rightfully belongs to gas. It is this partnership plan that truly opens the door to real contractor cooperation and volume gas boiler sales. The utility's position in this firm is that of salesman, publicity and advertising man, and in some cases finance company. The contractor's position is that of estimator for the sales force, consulting engineer, and advisor.

The first principle that must be taken into account by utilities in formulating a partnership plan is that they are essentially wholesale distributors of boilers to the heating contractor and not retailers to their customers. To put it another way, the whole accounting system should be based on the trade price to the contractor. With this in mind the utility will then organize its sales force to act in two distinct fields, related it is true, but still separate, first acting in a strictly jobbing capacity to the trade, supplying the trade the boiler and control equipment at the manufacturer's published trade prices; secondly, selling the complete installation including boiler controls, radiation, pipe, fittings and specialties to the consumer at a figure obtained from a heating contractor. In other words, acting in the partnership as a salesman, and handling the account. The accounting department will have to work out the bookkeeping details according to the particular requirements of the utility. The boiler and controls are either sold to the contractor in a separate transaction or deducted from the original figure the contractor submits to the utility.

We here have the true functioning of a partnership between the utility and the contractor, all details pertaining to installation, engineering and estimating

(*Continued on Page 48*)

*Presented before the Central Regional Conference of the Pacific Coast Gas Association, November 22, 1929, at San Francisco, California.

Needed: True Economy *in* Production *of* Natural Gas

With Special Reference to Louisiana Fields

By CHARLES A. BREITUNG
Consulting Gas Engineer
Shreveport, Louisiana

FROM an intimate contact with the varied aspects of natural gas production, particularly in the State of Louisiana, Mr. Breitung in these pages does a sympathetic bit of editorializing in the interests of sane conservation "at the well." His observations are directed at areas which produce gas alone, as distinct from oil bearing structures. Hard lessons of experience have presumably driven home the fact that natural gas is neither worthless nor limitless in supply—yet in many sections wasteful methods of development and production are still the rule. Conceptions of what is good practice in natural gas production have progressed far in recent years. It is the intent of Mr. Breitung's discussion to indicate the direction of this newer "good practice," and to emphasize the need for its universal adoption.—*Editor.*

Charles A. Breitung

WITH the discovery of large natural gas reserves in the northwestern and northeastern sections of Louisiana, and with the construction of a number of large pipe lines to transport the gas, the problem of proper withdrawals and methods of development of gas areas becomes of increasing importance. Much of this discussion could find application in other gas producing areas, but it is the intent of this article to treat particularly the constantly evolving practice current in the natural gas fields of Louisiana.

Too much stress can scarcely be laid upon the conservation of already established reserves and the wastage invited in the drilling of additional gas acreage over and beyond the market requirements. Natural gas has never been a cheap commodity, despite the price valuation of it throughout the past years. Its value should always have been measured and determined by the comparison afforded with other fuels. To wantonly destroy or over-develop a stored supply of potential heat and energy is a vicious practice reconcilable by no pleadings of circumstance nor stern necessities of practical operation.

A National Necessity

The public mind must finally be awakened to the need of enlightened procedure in the husbanding of these vast resources at our national disposal, and public opinion can well afford to observe that putting a cheap price upon a commodity, rather than abiding by the values set up by supply and demand in open competition with other fuels, is a fallacious and unsound economy which will cost dearly later on. It is therefore of vital importance to continue a program of improved methods and operating practices which will safeguard the lives of these various natural gas fields.

It is pertinent to note the needless wastage which took place in what were obviously reserves of natural gas. Attention has been called to the appalling gas wastage in such areas as Cotton Valley and Pine Island, which were primarily oil areas. Their oil production, however, has admittedly been disappointing, for one very good reason—i. e. that the pressure decline which took place in the wastage and exhaustion of the gas precluded the possibility of any favorable oil recovery. The value of the natural gas to the wells was regarded as so low that literally billions of cubic feet were sacrificed to obtain a few thousand barrels of oil—in the haste to get an immediate and quick return on the hazardous investment made.

Such practices have their elements of reasonable argument, if the cost of the operation happens to fall to the individual instance. It is a natural trait to expect ardently that immediate returns shall reward risk, despite all other factors. When "my money" is involved the urge is to act along lines of self opportunism.

It is the objective of this paper to attempt to point out certain practices in vogue, certain changes in the making and certain incidents of finished business which have occurred in the distinctively "natural gas" fields, where gas production is not associated with oil recovery. These natural gas fields in Louisiana are on the threshold of a vast development, and with proper handling and care can be made to serve as the fuel and energy supply of a large portion of the Southern and Central states.

Put Gas to Proper Uses

Two elements are vital to the continued development and safeguarding of these supplies, proper conservation and the establishment of fair market prices for the gas. The available and potential markets for the gas will continue to expand and develop without interruption, and this unlimited development will necessitate the spirit of cooperation between the producers of the gas, the transporters and distributors, and the users. It is to be condemned that natural gas fuel is introduced in competition with other fuels which are closer to market, or basically cheaper for certain purposes, chiefly in large consumption for certain industries.

To offer a perfect fuel like natural gas in open competition with other cheaply produced and abundant fuels, at a price far below the basic values commensurate with sources of supply, reserves, continuity of exploration and the other factors involved, is harmful both to the producers and to the national welfare in that it creates an unfair and low price level for the commodity and at the same time hastens the final day of exhaustion of a vital asset.

Louisiana's Example

In the State of Louisiana due recognition of the importance of conservation of all natural resources has been taken. The Conservation Department of the state functions effectively and stands as the mediator in the development of these natural resources. In the past year the Minerals Division of the Department, in charge of oil and gas, has been actively concerned with the far reaching and beneficial policy of fostering operators' committees to act for the common good of all. The Conservation Department is impartial in its suggestions and is giving effective service in the procedure of the work at hand.

Too often a state body has adopted an unsympathetic attitude in exercising its police authority, lack of understand-

(*Continued on Page 59*)

PACIFIC COAST GAS ASSOCIATION

447 Sutter Street, San Francisco, California
A Department Conducted by Clifford Johnstone, Managing Director

"Modernize with Gas" Will be Convention Theme

A GREAT deal was done during the Association's Central Regional Conference, held in San Francisco November 21st and 22nd, to organize the studies now in progress by committees and give the work the impetus which leads to useful accomplishment.

In addition to the programmed Section Conferences and General Sessions, meetings were held by the following committees:

General

Board of Directors, F. H. Bivens, President
Program Committee, D. L. Scott, Chairman
Cooperative Advertising, D. L. Scott, Chairman

Commercial Section

Domestic Sales, L. J. Brundige, Chairman
Industrial Sales, Ray Trowbridge, Chairman
Architects' & Contractors' Service, F. L. Moon, Chairman
Ordinances, F. J. Schafer, Chairman
Advertising, Walter Thurber, Chairman

Public Relations Section

Meeting of Committee Heads, Geo. L. Myers, Chairman.

Technical Section

Distribution, W. M. Henderson, Chairman
Natural Gas Transmission, M. R. Thompson, Chairman
Production, W. A. Bahr, Chairman

Cooperative Advertising

The Board of Directors endorsed the plans of the four Section chairmen, and also approved the plans of the Cooperative Advertising Committee as reported by Chairman D. L. Scott. These plans involve the continuance of our present cooperative campaign for another 12 months, and having secured the approval of the Board of Directors, this will go to the Ways and Means Committee for the final discussion on financing.

Gas Engineers Handbook

Frank Wills, chairman of the Committee on Gas Engineers Handbook, reported to the Board that the copy for the Handbook would be completed early in the Spring and that negotiations for its publication by the McGraw-Hill Book Company were under way.

Future Meetings

Other conferences this year will take the forms of Section conferences with attendance solicited from all parts of the Coast. A joint conference of the Technical and Accounting Sections will be called in February in Los Angeles, to be followed shortly by a joint conference of the Commercial and Public Relations Sections. Regional conferences of the Sections may also be held in the Northwest if the Section chairmen and vice-chairmen find them desirable. A conference of all Sections will, however, be held in Seattle early in June, as previously announced.

Convention Plans

D. L. Scott secured the approval of the Board for the Convention Plans outlined by the Program Committee. The Convention will take place at the Hotel Huntington, Pasadena, starting on Tuesday, September 9th and closing on Friday, September 12th. All programs will be built around the theme *"Modernize with Gas"*. General sessions will be planned on Tuesday afternoon, Tuesday evening, Wednesday morning, and Friday morning. Parallel sessions of Sections will take place on Wednesday afternoon and Thursday morning. Features of the Convention will be a convention ball on Wednesday evening, a golf tournament on Thursday afternoon, and visits to two exhibitions on Friday afternoon, the first dealing with modern distribution methods, and the second with industrial utilization practice. Three-minute speaking contests and stunts night will be features of the Public Relations Section program, and the Convention will close with a banquet on Friday evening.

Accounting Section Plans

The Accounting Section under the leadership of D. G. Martin will continue the work on Capital Records, General Records, and Statistics, left unfinished last year. So much arduous work is involved that it is possible that no new studies will be undertaken.

Commercial Section Plans

J. Earl Jones reported some slight changes in the organization of the Commercial Section from that reported in October *Western Gas*.

The complete committee organization is as follows:

ADVERTISING COMMITTEE

Walter Thurber, Chairman, Southern Counties Gas Co.
John H. Hartog, Portland Gas & Coke Co.
F. H. Holden, Southern California Gas Co.
J. Chas. Jordan, Pacific Gas and Electric Co.
A. A. Knoernschild, Seattle Lighting Co.
Jas. Lightbody, British Columbia Electric Power & Gas Co.
E. P. Ramsay, Los Angeles Gas and Electric Corp.
Forrest Raymond, San Diego Consolidated Gas & Electric Co.
A. A. Salmon, Spokane Gas & Fuel Co.

ARCHITECTS & CONTRACTORS SERVICE MANUAL COMMITTEE

Frank Moon, Chairman, Los Angeles Gas and Electric Corp.
C. A. Beugher, Utah Gas & Coke Co.
H. W. Elder, San Diego Consolidated Gas & Electric Co.
N. O. Fratt, Seattle Lighting Co.
J. C. Gilbert, Southern Counties Gas Co.
C. P. Hering, Pacific Gas and Electric Co.
John Keillor, British Columbia Electric Power & Gas Co.
W. J. Lane, Turlock Gas Co.
C. E. Lasher, Washington Gas & Electric Co.
J. F. McIndoe, American Radiator Co., Portland.
A. G. Smith, Portland Gas & Coke Co.
A. L. Spring, California Servel, Inc.
H. M. Thomas, Northwest Cities Gas Co.
H. L. Warren, Southern California Gas Co.

DOMESTIC SALES COMMITTEE

L. J. Brundige, Chairman, Pacific Gas and Electric Co.
F. M. Banks, Southern California Gas Co.
Sidney Beck, Estate Stove Co.
L. Cinq-Mars, Humphrey Co.
R. W. Coblentz, Sub-Chairman, Cooking Com., Washington Gas & Electric Co.
Frank Cronan, Coast Counties Gas & Electric Co.
C. H. Dickey, Jr., Hot-N-Kold Corp.
Geo. Egleston, H. R. Basford Co.
M. W. Gahan, Coast Counties Gas & Electric Co.
W. L. H. Geldert, Southern Counties Gas Co.
O. R. C. Grow, Sub-Chairman, Waterheating, Southern Counties Gas Co.
M. C. Hancock, Washington Gas & Electric Co.
E. J. Hinchey, Jas. Graham Mfg. Co.
S. R. Hutchinson, Seattle Lighting Co.
Rudolph Jenny, Pacific Gas and Electric Co.
W. M. Kapus, Northwest Gas & Electric Equipt. Co
Guy R. Kendall, Northwest Gas & Electric Equipt. Co
Andrew Kerr, Steiger & Kerr Stove & Foundry Co.
H. B. McLaughlin, Coast Counties Gas & Electric Co.
Ed Marshall, Madera Gas Company
A. C. Miller, Sub-Chairman, Householeating, Pacific Gas and Electric Co.
W. W. Norton, Electrogas Furnace Co.
C. Roy Ohnimus, Hammer-Bray Co.
John Reid, Los Angeles Gas and Electric Corp.
F. W. Schwab, Tappan Stove Co.
A. L. Spring, California Servel, Inc.
A. P. Stryker, Pacific Gas and Electric Co.
W. F. Suess, Southern California Gas Co.
H. M. Thomas, Northwest Cities Gas Co.

GAS REFRIGERATION COMMITTEE

G. W. Smith, Chairman, Southern Counties Gas Co.
Ray Alexander, Washington Gas & Electric Co.
A. E. Finlay, Portland Gas & Coke Co.
R. C. Finch, Portland Gas & Coke Co.
J. Fremont, British Columbia Electric Power Co.
J. H. Gumz, Pacific Gas and Electric Co.
L. A. Hubbs, Servel Sales, Inc.
Ed Kern, Southern California Gas Co.

INDUSTRIAL SALES—MANUFACTURED AND NATURAL GAS

Ray Trowbridge, Chairman, Pacific Gas and Electric Co.
Geo. Bowersox, Assistant Chairman, Jas. H. Knapp Co.
Frank Beardsley, Coast Counties Gas & Electric Co.
Robt. Carver, British Columbia Electric Power & Gas Co.
E. M. DeRemer, Southern California Gas Co.

Wm. Duggan, Northwest Gas & Electric Equipt. Co.
Allen T. Fesler, Santa Maria Gas Co.
J. H. Gumz, Pacific Gas and Electric Co.
Herbert Haas, Pacific Gas and Electric Co.
A. A. Knoernschild, Seattle Lighting Co.
D. L. Leahy, Southern Counties Gas Co.
R. J. Phillips, San Diego Consolidated Gas & Electric Co.
C. A. Thorp, Los Angeles Gas and Electric Corp.
C. M. Toynbee, Washington Gas & Electric Co.

ORDINANCE COMMITTEE

F. J. Schafer, Chairman, Southern California Gas Co.
C. Y. Bowers, Washington Gas & Electric Co.
H. L. Boyd, Sec. Hardware Dealers Assoc. of So. Cal.
A. A. Caldwell, Turlock Gas Co.
H. M. Crawford, Pacific Gas and Electric Co.
H. W. Elder, San Diego Consolidated Gas & Electric Co.
C. M. Grow, Asst. Chairman, Southern California Gas Co.
L. F. Galbraith, Pacific Gas and Electric Co.
E. J. Hinchey, Jas. Graham Mfg. Co.
L. A. Hubbs, Servel Sales, Inc.
H. R. Masser, Los Angeles Gas and Electric Corp.
C. R. Miller, Portland Gas & Coke Co.
N. E. Paulsen, Coast Counties Gas & Electric Co.
C. H. Potter, Southern Counties Gas Co.
J. A. Stadtfeld, Plant Rubber & Asbestos Co.
J. L. Stone, Spokane Gas & Fuel Co.
F. S. Thomas, Coast Counties Gas & Electric Co.

SALES BUDGETS COMMITTEE

C. R. Miller, Chairman, Portland Gas & Coke Co.
W. J. Cady, Portland Gas & Coke Co.
Lee Holtz, Southern California Gas Co.
Roy C. Monroe, Public Service Co. of Colorado.

Public Relations Section Plans

Geo. L. Myers reported that the following men had been selected to lead Public Relations activities during the year:

Jas. Lightbody, British Columbia Electric Power & Gas Company, Vancouver, will act as chairman of the committee on "Employees Relations with the Industry." Associated with Mr. Lightbody will be E. G. McCann, Pacific Gas and Electric Company, and Clyde F. Stanley, Los Angeles Gas and Electric Corporation.

Miss Mildred Hinrichs, Pacific Gas and Electric Company, Salinas, will be chairman of the Women's Committee. Miss Hinrichs was vice-chairman of this committee last year.

J. F. Pollard, Pacific Gas and Electric Company, will act as chairman of the Committee on "Employees Relations with the Public". H. W. Beekman of the Pacific Gas and Electric Company, will work with Mr. Pollard on the specific topic "Customers' Relations".

D. L. Scott, Los Angeles Gas and Electric Corporation, will be in charge of Public Relations Stunts; D. C. Ray, Pacific Gas and Electric Company, of Three-Minute Speaking Contests; and F. H. Holden, Southern California Gas Company, of the Essay Contest.

E. C. Cox, Southern Counties Gas Company, will act as chairman of the Customer Ownership Committee.

The theme of both the Essay Contest and the Stunts Night will be "Modernize with Gas". The Women's Three-Minute Speaking Contest will be on "Gas in the Home", and the men will talk on "Gas in Industry".

Technical Section Plans

Wm. Moeller, Jr., chairman of the Technical Section, reported that the three major divisions of the Section were organized and functioning under the able leadership of W. M. Henderson in charge of Distribution, M. R. Thompson in charge of Natural Gas Transmission, and W. A. Bahr in charge of Production.

The sub-committees appointed by Mr. Thompson are shown below. Distribution and Production sub-committees will be listed on this page in January.

COMPRESSOR STATIONS

C. S. Pool, Chairman, Ventura Fuel Co.
A. B. Newby, Southern California Gas Co.
S. S. Donaldson, Southern California Gas Co.
Grove Lawrence, Southern California Gas Co.
F. Driggers, Ventura Fuel Co.
H. V. Powell, Ventura Fuel Co.
O. A. Philpott, Pacific Gas and Electric Co.
T. C. Wallace, Southern Counties Gas Co.
Subjects:
1. Air cleaners on gas engine air intakes.
2. Heat dissipation for dry exhaust lines.

TRANSMISSION PIPE LINES

B. M. Laulhere, Chairman, Southern California Gas Co.
A. E. Haun, Southern California Gas Co.
A. E. Hall, Coast Counties Gas Co.
F. F. Doyle, Pacific Gas and Electric Co.
E. Henderson, Southern California Gas Co.
F. E. Jinnett, Ventura Fuel Co.
R. L. Cook, Southern California Gas Co.
Carl Summers, Southern Counties Gas Co.
Subjects:
1. Design and equipment for the removal of liquid and solid impurities.
2. Design and capacity of bleeders.
3. Collaboration with Distribution Committee on pipe line protective materials and methods.

LARGE VOLUME MEASUREMENT

B. G. Williams, Chairman, Southern California Gas Co.
F. A. Hough, Southern Counties Gas Co.
M. Levering, Southern California Gas Co.
H. M. Dwight, Southern California Gas Co.
F. M. Cota, San Diego Cons. Gas & Electric Co.
L. W. DesBrisay, Los Angeles Gas and Electric Corp.
C. P. Fulcher, Pacific Meter Works
R. M. Stewart, Pacific Gas and Electric Co.
F. H. Winslow, Southern Counties Gas Co.
Subjects:
1. Methods and equipment for field test on large capacity meters.
2. Review material prepared for Gas Engineer's Handbook.

Section Conferences and General Session

Inasmuch as the discussions and reports which were a part of the Section Conferences are only preliminary to the program for the year, they will not be reported here.

Those who attended the luncheon on November 22nd were entertained by the Neopolitan Quartet and had the pleasure of listening to Paul M. Downing, vice-president and general manager of the Pacific Gas and Electric Company, who was introduced by President Bivens as a reformed electric man. Mr. Downing spoke briefly on the tremendous program of his company in making natural gas available to northern California.

At the afternoon general session W. L. Hoyt of the American Radiator Company discussed the advantages of selling gas fired boilers through established heating contractors; L. T. Jones, consulting physicist, described measurements he had made of stresses produced in making butt welds, and R. E. Fisher, vice-president of the Pacific Gas and Electric Company, made a very informative and able address on the public relations problems incident to the introduction of natural gas.

A Plan *for* Gas Boiler Sales

(Continued from Page 45)

being done by the contractor, who guarantees the installations to the utility. When this policy is first inaugurated, the utility will do practically all the selling for the contractor, a well as undertaking the minor adjustments necessary when starting the boiler. As time goes on and the contractor fully realizes the advantages of gas boiler heating, both to himself and his customers, the selling burden will gradually be taken on by the contractor, so that eventually this burden will be shouldered by both partners. The utility will always have to bear the brunt of the selling effort in order to keep gas definitely before the public, but by working through the contractor its efforts will result in real volume sales.

THE UTILITY SALES FORCE

Assuming that a utility adopts the principles of the policy outlined, training of the sales force is not at all difficult. Usually one man is designated to contact the trade and supervise the salesmen on all boiler work. This man obtains the selling price for his salesmen and is responsible for trade, architectural and engineering contacts. He does not of necessity have to be technically trained, but should possess the gift of getting the contractor's confidence, and should have a fair knowledge of heating principles. The balance of the men in the sales force do not need special training, other than in the obvious advantages of gas for heating and what radiator type of heating will do for their customers. These men should not be permitted to contact the trade; all dealings between the utility and the contractor should be handled by one man. This trade contact man, as he is often called, should also handle all the jobbing or wholesaling of boilers to the contractors and should assist them in every way possible to sell gas boilers on their own initiative.

It is mentioned above that the contractor guarantees the installation to the utilities. This does not mean that the utilities can forget about this important phase of gas boiler heating. This responsibility rests entirely on the trade contact man. He must deal only with the true heating contractor who thoroughly understands the boiler system. Like everything else, complete satisfaction is impossible with boilers that are improperly installed, and nothing can do more to hurt gas heating than faulty installation.

Not so very many years ago a large manufacturer of heating equipment put a small boiler on the market to popularize radiator heating. This boiler was sold with the radiation as a unit and immediately created a tremendous demand, so much so in fact that the speculative builder was forced to fall in line. For a time the system was installed only by the recognized heating contractor and the results were most satisfactory. As time went on and building became more and more competitive, the speculative builder went beyond the true heating contractor to obtain a cheaper figure. As a result, the quality of installations became worse and worse, and both radiator manufacturers and the utilities have felt the adverse effects. This is mentioned simply to emphasize the importance of correct installations.

The utility is in a position to insist on a quality installation and can very easily place gas fired boiler plants above the competitive field. One of the first principles toward this end is never to take more than one figure on a prospect. If competitive bids are taken there is danger of sacrificing the quality a utility should demand, in the contractor's endeavor to beat competition. On the other hand, when the contractor knows the utility is behind him alone on a particular prospect, the figure he gives the trade contact man will include only quality material and the selling effort of the utility on that prospect is doing him a real service, which he is quick to realize. This is one of the great advantages in the partnership plan. The utility operating in this manner is not only putting the heating and water heating load on its lines in the easiest manner, but is also offering a concrete and tangible service to the contractor. The trade contact man divides the business as fairly as possible among the contractors.

MECHANICS OF PLAN

Let us briefly outline the mechanics of the partnership plan:

I. The salesman interviews the prospect and obtains a request for a figure on the cost of installation.

II. The salesman then files prospect with the trade contact man, who obtains a complete figure on the installation from a contractor, together with a guarantee.

III. The salesman presents this figure to his customer as the cash price on the installation, and with the help of the contact man sells him.

IV. On completion of the installation, the contractor is paid in full by the utility, usually less the trade price of the boiler and controls which are furnished him.

V. The trade contact man jobs boilers to the contractors and assists them in making their own sales—which is the real purpose of the plan.

VI. The advantages of this plan to the utility are as follows:

1. It greatly simplifies the sales organization and training.
2. It lessens the sales resistance for the selling force.
3. It encourages independent selling by the contractor.
4. It assures the proper installation of the boiler.
5. It gives gas boiler heating the backing of the heating fraternity.
6. It opens the door to volume gas boiler sales.

VII. Now let us review the advantages to the contractor:

1. It gives him an active selling force.
2. It gives him his regular profit on all material.
3. It gives him an opportunity to finance his installations, through the utility.
4. It assists him in his efforts to put in quality installations and gets him out of the competitive field.
5. It opens a large field he has not touched.

When a utility works on a plan of this nature, it is not hard to make the contractor realize what gas fired boilers will do for him, for it is proven by his own installations. He knows that the gas fired boiler is the cheapest fully automatic radiator heating system, but he needs the utility cooperative selling to convince him that gas is the best fuel for his clients.

Upon starting the partnership plan, a meeting with the heating and piping contractors is advisable in order to present the boiler program, and explain the utility's position clearly. Next, the policy should be put in writing and forwarded to the contractors. The whole object is a complete and thorough understanding between the two partners, with the position of each defined clearly.

The profit from a merchandizing viewpoint is of necessity small, but the benefits from increased load are large indeed. If a utility does not wish to operate on the small distribution profit it is quite possible that a plan can be worked out whereby the contractor is willing to deduct a selling commission or fee when submitting the selling price to the trade contact man. The details can be worked out according to local conditions. In the smaller utilities or in branches of large utilities, the duties of the trade contact man are taken over by the sales manager or district manager respectively. The main point is the partnership of the utility and the contractor, without which partnership and thorough understanding, gas fired boilers will never attain their real success. A plan incorporating the above principles as its foundation should enable the utility to fully develop the boiler field and obtain the large heating and water heating load in its territory. Let us work with the contractors in their field to the end that gas as a fuel for boiler heating will be generally accepted and recognized.

CONSERVATION SEEN AT BEST IN VENTURA AVENUE FIELD

The six major oil operators in the Ventura Avenue field of California are now conforming to the order of the State Mining Bureau Oil and Gas Commission in the matter of gas conservation, through a curtailment agreement effected late in November. Gas production has been prorated among the companies, and reduced from approximately 280,000,000 to 150,000,000 cubic feet daily, with a 10 per cent surplus above existing outlet allowed by the Commission order. This curtainment achievement is held up as the most effective step yet taken in the State program of gas conservation. A. S. Hayes, production engineer of the General Petroleum Corporation of California, heads the engineering committee which worked out the details of the gas cut.

APPLIES TO BUY UTILITIES AT MADERA AND TURLOCK

Southern California Gas Company has applied to the California Railroad Commission for permission to purchase and operate the Madera Gas Company and the Turlock Gas Company, both utilities being controlled by the Pacific Lighting Corporation.

NEBRASKA PIPE LINE COMPANY IS NEWLY ORGANIZED

The Nebraska Pipe Line Company has incorporated for $1,500,000 and has started the construction of pipe lines to cities and towns in southern and central Nebraska, where an affiliated company, the Nebraska Natural Gas Company has secured franchises. These are at Crete, Wilber, Ashland, Chester, Deshler, Fairfield, Clay Center, Harvard, Sutton, Blue Springs, Syracuse, Wahoo, Davenport, Edgar, Shelton, Wood River, Hebron and Gibbon.

According to news dispatches this represents a combination of the Insull interests with Columbia Carbon, the Skelly Oil Company and the Texas Company. Negotiations are now in progress to supply Lincoln and Omaha.

The pipe line company will act as wholesale agency for supplying natural gas to the franchise holders in the towns.

PLAN TO SERVE LIQUEFIED GAS TO NO. CALIFORNIA TOWNS

The Natural Gas Corporation of California, Ltd., newly organized, submitted a plan to the State Railroad Commission on November 23 to serve liquefied petroleum gas, processed in especially designed plants, to a score or more communities in the San Joaquin Valley and northern California, including the following, in which application for franchise has been made:

Delano, Corcoran, Sanger, Clovis, Isleton, Rio Vista, Suisun, Fairfield, Vacaville, Dixon, Winters, St. Helena, Calistoga, Sonoma, Lincoln, Wheatland, Williams, Orland, Corning, Dunsmuir and Yreka. Unincorporated towns in which it is also the company's intention to construct distributing systems include Shafter, McFarland, Wasco, Anderson, Cottonwood and Arbuckle.

Reginald Vaughn, a San Francisco attorney and counsel for the Coast Counties Gas & Electric Company, a subsidiary of Standard Oil Company of California, filed the petition with the Commission.

SAN DIEGO NATURAL GAS PLAN SET FOR DEC. 11 HEARING

As the latest development in its plan for bringing natural gas to San Diego, the San Diego Consolidated Gas and Electric Company in November asked the California Railroad Commission to approve a contract for purchase of natural gas from the Southern Counties Gas Company, and to establish rates for service of 1100 B. t. u. natural gas in place of oil gas of about half the above heat content, now being distributed. December 11 has been set for a Commission hearing on the application, at San Diego, at which details of the contemplated purchase contract will be presented.

SALEM, OREGON, GETS PORTLAND GAS ON NOVEMBER 21

Gas was turned into the mains of the Portland Gas & Coke Company at Salem, Oregon, on November 21. Gas is being supplied through a 50-mile line from Portland, as reported elsewhere in this issue of *Western Gas*. The Salem gas plant formerly operated by the company will be used for emergency service.

SALES WRINKLES

"He Gains Wisdom in a Happy Way Who Gains it by Another's Experience" . . PLAUTUS

$10 for a Wrinkle!

WESTERN GAS' "Sales Wrinkle" Department gets in motion this month, with the publishing of five live ideas which can be made to jingle cash in the till if rightly applied.

Here are the gas men (salesmen and otherwise) who contribute to this month's Wrinkle page:

R. C. Fleisher, 3305 Cedar Street, San Diego, California.

L. L. Baxter, Pittsburgh Water Heater Company, Dallas, Texas.

D. J. Bartelme, Pacific Gas and Electric Company, 447 Sutter Street, San Francisco.

J. A. Martin, Lone Star Gas Company, Dallas.

S. C. Singer, Southern California Gas Company, Glendale, California.

WESTERN GAS has paid for these five Wrinkles, at $10 each—and we will pay at the same rate for YOUR sales tip, if it is sufficiently good to pass on to our readers.

Address your Wrinkles to our publication office, 124 West 4th Street, Los Angeles, California.—EDITOR.

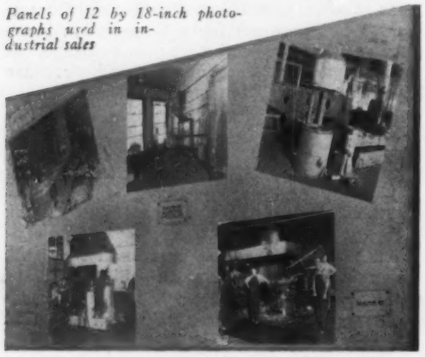
Your Story in Pictures . . .

THE Pacific Gas and Electric Company has hit upon the novel idea of using enlarged photographs for sales promotion. The over-sized photos are especially effective in the new industrial display room at 31 Beale St., San Francisco. Above each individual display a large board on which are mounted several super-enlarged photographs, about 12 inches deep by 18 inches wide, shows the appliance in an actual installation on some industrial job.

These photographs attract considerable attention, because they reproduce actual installations, which the prospect could not easily visualize for himself when shown the equipment apart from its setting. They are naturally far more impressive than views of ordinary size, and can show detail of plant operations and apparatus in a more satisfactory way than can smaller photographs.

—D. J. Bartelme.

Panels of 12 by 18-inch photographs used in industrial sales



Get Prospects by Guess . . .

FROM balmy San Diego we hear of an oven-temperature guessing contest which has proved out as a prospect-getter on gas ranges—as well as promoting the oven heat control with the public.

R. C. Fleisher outlines the steps for staging his contest as follows:

Properties consist of a gas range fitted with oven heat control; also a box arranged to slip over the control to close it from view. To prevent tampering with the control, the box may be attached to the stove with a long bolt through the bolt hole provided for clamping the control in place.

Registration cards must be provided for entering guesses. The cards may provide blanks for name; address; phone number; oven temperature guess; time of guess (so that first entrant to guess correct oven heat may be adjudged winner, in case of more than one correct guess); and such sales information as desired may be requested—i.e., present range used, what other gas appliances in home, etc.

Contestants may be allowed to use any method except thermometer in guessing temperature—place hands in oven, use the paper-browning or flour-browning test, or other means. To limit each entrant to one guess, names should be recorded in a book after each guess. Contest may run for any time period desired. To wind up the event a public meeting may be held, with accompanying advertising and publicity, and with a committee on hand to remove box from oven heat control and announce the temperature called for. Registration cards are then taken from the box in which they have been deposited, and prizes awarded.

Mr. Fleisher adds this postscript:

"It will be found that nearly all guesses will miss the mark by a wide margin. This is good propaganda for the sale of oven heat controlled ranges!"

—R. C. Fleisher.

When Leakage Crews Turn Salesmen

HOW to reach the isolated consumer, located within reach of the transmission line—effectively, and at the least cost! This problem ought to be attacked by every utility operating gas lines outside of thickly settled territory. "Farm electrification," of which we hear so much, must have its parallel in the extension of 100 per cent gas service to the rural customer.

And here the experience of the Lone Star Gas Company may be of help.

The Lone Star has made its leakage inspection department a part of the appliance sales organization of the Community Natural Gas Company, a subsidiary.

Leakage inspectors have been given catalogues and price lists and a commission on all sales which they make to right-of-way consumers. There are 1,581 of these consumers scattered over the 3,500 miles of lines of the company.

Inspectors call on these consumers every three months in the course of their regular duties. The plan opens an otherwise inaccessible market for gas appliances, equal to that afforded by a good sized town plant, and at no additional sales cost.

—J. A. Martin.

Gas-Minded Town Druggist

SHALL we herald in the day when the corner drug store will carry a full line of gas appliances? Well, maybe.

In Montrose, a very small town in southern California—too small to support a gas company sales office—arrangements have been made with the Montrose Drug Company to display and actively push sales on a diversified list of domestic gas appliances. The proprietor is paid a 5 per cent commission for sales made by him; he gets 2 per cent on sales made by gas company salesmen at the drug store display. Company salesmen calling upon prospects in and around Montrose find the convenient drug store display invaluable in closing inter-

ested prospects—who can't be blamed for wanting to see the goods before they buy.

Two ranges, a water heater, two radiant-type heaters, and a gas refrigerator connected to show the tiny flame that freezes, are now on the Montrose Drug Company floor.

Establishing sales outlets at a maximum number of points in the gas company's territory—particularly in smaller centers—is in line with good merchandising practice and can be done on a profit basis.

—*S. C. Singer.*

This Paint Job Sold Gas Heating

A BIT of practical ingenuity is sometimes the *open sesame* to a sale. This was the case in Dallas, where a steam radiator distributor found a new brand of sales resistance. We let him supply the answer to his problem in his own words:

"Recently we contacted a church committee who were prepared to install gas-fired steam radiators in their building. The radiators, however, had to match the organ, the pews, and generally fit in with the interior of the church. The big obstacle to the finished sale was that of painting the radiators a suitable color. Ordinary paint would not do in a case like this, of course, because it would not stay on the radiators any length of time when subjected to heat.

"We called our paint representative in and found that by spraying the radiator with a paint as free from oil as possible—allowing this to dry, then giving the job a "dust coat" of gold, bronze, copper, antique copper, that any desired color could be had. We took a flat, washable paint, poured off all oil possible, mixed the paint with gasoline, sprayed on the paint, allowed this to dry, then sprayed on the "dust coat." In the latter case the spray gun was held as far away from the radiator as possible, so that a thin spray could be applied.

"Through this means we solved the color question at the church and completed the sale."

—*L. L. Baxter.*

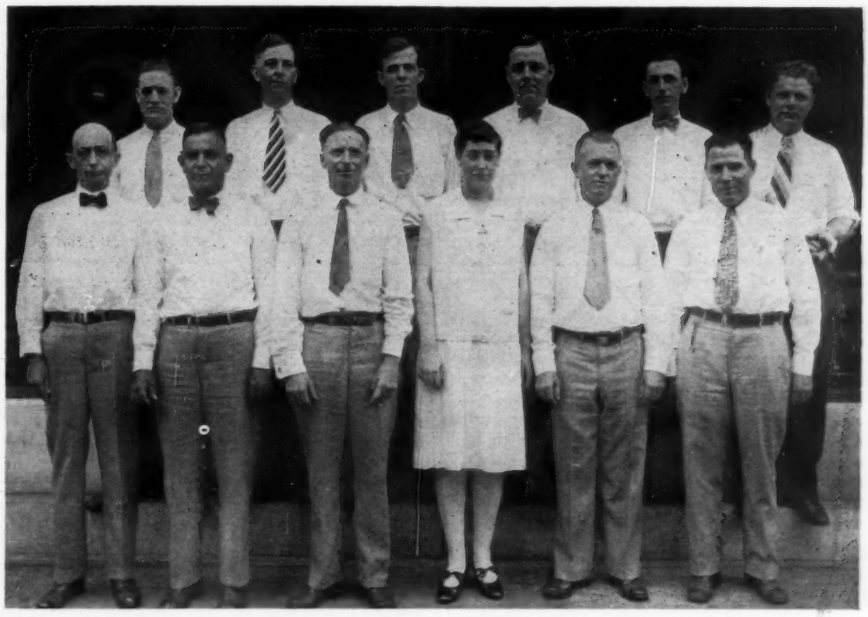
R. W. CAMPBELL ASSOCIATED WITH L. J. MUELLER FURNACE CO.

R. W. Campbell has joined the organization of the L. J. Mueller Furnace Company of Milwaukee, Wisconsin, manufacturer of gas furnaces and boilers.

R. W. Campbell

Mr. Campbell, a graduate of Purdue University, has been identified with the gas heating industry on the Pacific Coast for eight years, and has a wide acquaintance with the utility and trade organization.

He was with the Southern California Gas Company for five years, and for the past several years has been general sales manager and engineer with the Payne Furnace & Supply Company of Beverly Hills, California. He expects to remain on the Pacific Coast.



Joplin record breakers—Commercial Department staff, Joplin Gas Company

140 Gas-Fired Washers Sold in This 28-Day Drive at Joplin, Missouri

By W. E. CARDEN

New Business Manager Joplin Gas Company, Joplin, Missouri

ON JUNE 1, 1929, the Joplin Gas Company, a Cities Service company, was appointed representative in Joplin, Missouri, for Thor Laundry Equipment. Twenty-seven days later the commercial department of the company began a sales campaign on the Thor line which resulted in selling 140 washers and 23 ironers. The campaign was conducted from June 28 to July 28.

Prior to our company being appointed as Thor representative we had handled another line of laundry equipment, but had only one representative who had sold the line. All of the other representatives, therefore, were new to the task of selling laundry appliances, however familiar they were with gas appliances in general.

During the early part of June we commenced talking Thor washers among the members of the commercial department. A few days later the campaign was planned in detail. In order that the members of the department might become thoroughly acquainted with the plans for the campaign, each one was handed a written report showing prices, amounts of bonus money and other particulars.

EVENING SALES MEETINGS

A regular custom of our department is the holding of sales meetings each Monday night from 7 p. m. to 9 p. m. The two Monday evenings preceding the sale were devoted to the discussion of Thor equipment. The purpose of the meetings was to familiarize each salesman with the Thor line, and to instill enthusiasm for the campaign.

Our representatives all work on a salary and a commission basis, so in order to create more interest among the men, bonus money was offered. By our special offer, a salesman was paid a $2.00 bonus for each washer or ironer he sold over a base number of five. The highest bonus paid was $78.00 for the sale of 38 washers and 6 ironers. On the last 10 days of the sale special prize money was offered the salesmen, and this was a further incentive for sales.

A minimum of advertising space was used during the campaign, this amounting to only four one-quarter page newspaper advertisements. More advertising would have been done had it not been for the fact that calls for demonstrations were coming in faster than the salesmen could handle them. We were somewhat handicapped in the sale by its being staged in vacation time. Four of our representatives were off 15 days each during the campaign. If all the representatives had been on duty all the time, it is felt that at least 200 units would have been sold.

During the sale washers and ironers were sold to every class of customer, from the wage earner to the wealthier citizen.

From the sales standpoint our city is divided into territories. A representative assigned to a territory gets credit for all the sales in his district, whether he makes the sale personally or whether it is made from the sales floor. Very few washers or ironers, though, were sold from the floor. Demonstrations were secured by the representative calling at each door in his district. At the time of the call a piece of literature was left with the prospect.

During the sale regular prices were reduced and small down payments were accepted. The salesmen, however, talked cash sales, and a 10 per cent discount for cash was offered.

With *the* Metermen

Meter Association Holds Exhibitors' Meeting

BRANCHING into a new field of service to its membership, the Southern California Meter Association on Thursday, November 21, conducted an "Exhibitors' Meeting"—a meter equipment exposition, which consisted of a display thrown open to all manufacturers and distributors of meters and related apparatus. The result was a most successful exhibit, covering new developments in many fields of meter practice, with working models, informative manufacturers' literature for distribution, and other features combining to form a varied educational appeal.

The exhibition was held in the auditorium of the Los Angeles Gas and Electric Corporation building in Los Angeles and was followed by a dinner meeting in the L. A. G. & E. cafeteria. More than 200 metermen and visitors from Southern California gas and oil companies attended the exhibit. The display opened at 4:00 p. m. and closed at 10:30.

On the list of exhibitors were the following companies:

Foxboro Company
Brown Instrument Company
Reliance Manufacturing Company
Westcott & Greis, Inc.
Leeds & Northrup
Neilan Schumacher & Company
Aetna Printing Company
Commercial Iron Works
Braun Corporation
American Liquid Meter Company
Pacific Pipe & Supply Company
W. R. Ladewig Company
National Meter Company
Natural Gas Equipment Company
The Bristol Company
Robinson Orifice Fitting Company
Pacific Meter Works
Jensen Instrument Company
Warren & Bailey Company

A very favorable reception was accorded the display and it is thought that a yearly exhibition of new apparatus in the meter field may be made a regular feature of Southern California Meter Association's program.

At the banquet 154 were seated, including 49 visitors, 30 associate members and 75 active members. During the business session at the November 21 meeting 14 active and 6 associate members were voted into the Association. Among other interesting business features of the program was the report of the recently organized Gadget Club, which submitted a number of models of new practical meter devices, to be described in later issues of *Western Gas.*

R. F. Angell, president of the Association, delivered a paper, "Methods Used in Computing Orifice Meter Charts; A Report on the Square Root Planimeter," followed by discussion, after which the meeting adjourned to view the exhibits.

A five-piece girls' orchestra, furnished through the courtesy of Westcott & Greis, Inc., and the Robinson Orifice Fitting Company, provided excellent music during the dinner hour.

A committee consisting of M. J. Cereghino, and L. P. W. DesBrisay of the Los Angeles Gas and Electric Corporation; M. R. Miller, Southern Counties Gas Company; and R. L. Cook, Southern California Gas Company, was in charge of the exhibition details.

Laurels in the November play-off of the *Western Gas* Goodfellowship Trophy golf tourney went respectively to Messrs. Burke, Farrel and Spring.

During the month of November the S. C. M. A. distributed two data sheets, prepared by the Standards Committee, and a copy of the Association by-laws, in booklet form.

Ninth Annual Meter Short Course, Dec. 3-6

UNDER the joint auspices of the Iowa State College and the Mid-West Gas Association, the Ninth Annual Gas Meter Short Course will be offered December 3-6, at the Iowa State College at Ames.

Four days of intensive study are planned for those participating, and many hours of practical work under expert supervision. A completely equipped meter shop for testing and repairing will be available, and a special program of papers and discussions has been prepared for men from the production and distribution departments of the industry.

All work in the course will be conducted in the engineering hall and engineering laboratory of the College. Class hours will be from 9 a.m. to 11:30 a.m., and from 1:00 p.m. to 4:30 p.m.

The Committee for the Ninth Annual Gas Meter Short Course is headed by Robert L. Klar, engineer of the Des Moines Gas Company of Des Moines, Iowa, and serving with him are George A. Lane of Chicago; D. C. Faber and V. L. Hein, Iowa State College; A. T. Barrett, American Meter Company, Chicago; H. R. Peirce, Sprague Meter Company, Davenport, Iowa; R. F. Galpin, Muscatine, Iowa; E. L. Fischer, Davenport, Iowa; and O. M. Hoxie, Mankato, Minnesota.

Following is the program prepared by the committee:

TUESDAY, DECEMBER 3

8:00-11:00 a.m. Registration, Engineering Hall.

11:00 a.m. Address of Welcome, Prof. D. C. Faber, Director Engineering Extension Department, Iowa State College. Outline of Course, R. L. Klar, Engineer Des Moines Gas Co., Des Moines, Iowa.

11:30 a.m. to 1:00 p.m. Luncheon, Alumni Memorial Hall.

1:00 p.m. to 4:30 p.m. Section A—"Shop Practice in Meter Shop." Sec. B—Room 207, Engineering Hall.

1:00 p.m. "Gas Dehydration," D. R. Putnam, Northern States Power Co., St. Paul, Minn.

2:10 p.m. "Cottrell Precipitator," J. M. Drabelle, Engineer, Iowa Railway & Light Co., Cedar Rapids, Iowa.

3:20 p.m. "35 Burning Questions," open meeting.

4:30 p.m. Adjournment.

WEDNESDAY, DECEMBER 4

9:00 to 11:30 a.m. Section A—"Shop Practice in Meter Shop." Section B—Room 207, Engineering Hall.

9:00 a.m. "Bread Baking," R. F. Galpin, Iowa Electric Co., Muscatine, Iowa.

10:15 a.m. "Naphthalene Determination," Peter DeHaan, Des Moines Gas Co., Des Moines, Iowa.

11:30 a.m. to 1:00 p.m. Luncheon, Alumni Memorial Hall.

1:00-4:30 p.m. Section A—"Shop Practice in Meter Shop." Section B—Room 207, Engineering Hall.

1:00 p.m. "Butane Carburetion," O. M. Setrum, Philfuels Co., Bartlesville, Okla.

2:10 p.m. "Linderman Orifice Meter," J. C. Diehl, American Meter Co., Erie, Pa.

3:20 p.m. "Pressure Regulators," Open meeting.

4:30 p.m. Adjournment.

THURSDAY, DECEMBER 5

9:00-11:00 a.m. Section A—"Shop Practice in Meter Shop." Section B—Room 207, Engineering Hall.

9:00 a.m. "Electrolux Refrigerator," C. W. Spiegel, Servel Sales, Inc., Chicago.

10:15 a.m. "Gas Meter Development," Norton McKean, Manager, McDonald Meter Co., Baltimore, Md.

11:30 a.m. to 1:00 p.m. Luncheon, Alumni Memorial Hall.

1:00-4:30 p.m. Section A—"Shop Practice in Meter Shop." Section B—Room 207, Engineering Hall.

1:00 p.m. "House Heating," N. M. Blanchard, L. J. Mueller Company, Milwaukee, Wis.

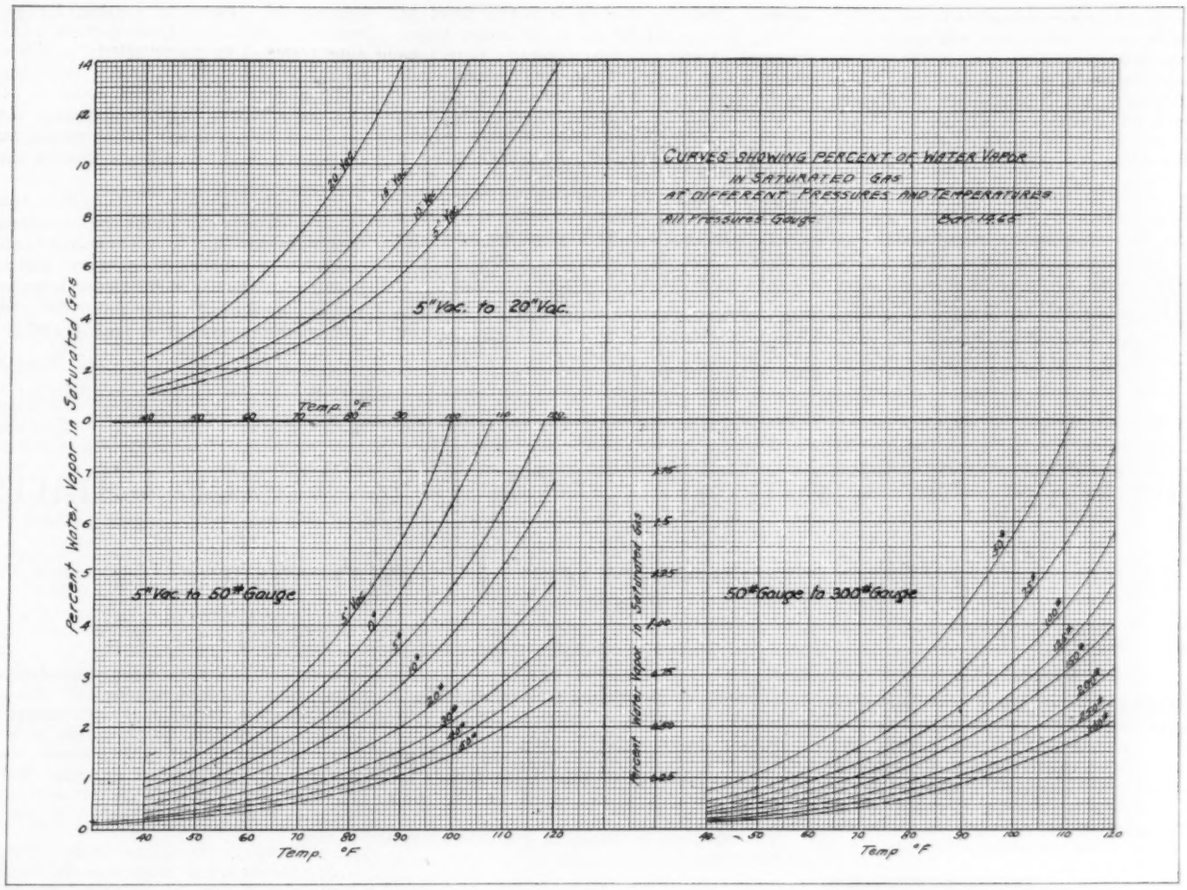
2:10 p.m. "Oil Scrubbing," Peter DeHaan, Des Moines Gas Co., Des Moines, Iowa.

3:20 p.m. "New Purifier Box," D. C. Tenny, American Gas Const. Co., Minneapolis, Minn.

6:30 p.m. Banquet. J. H. Ainsworth, Managing Director, Iowa Railway & Light Co., Ames, Iowa.

FRIDAY, DECEMBER 6

9:00-11:30 a.m. Section A—"Shop Practice in Meter Shop." Section B—Section B will visit the meter shop and observe the work done by the shop practice section during the course.


CURVES SHOWING PERCENT OF WATER VAPOR IN SATURATED GAS AT DIFFERENT PRESSURES AND TEMPERATURES
All Pressures Gauge
Bar 14.65
Percent Water Vapor in Saturated Gas
5" Vac. to 20" Vac.
5" Vac. to 50# Gauge
50# Gauge to 300# Gauge
Temp. °F
Temp °F

The Effect *of* Water Vapor *on the* Measurement *of* Gas Under *a* Vacuum

By P. W. Hill
*General Petroleum Corporation**

THE subject of the effect of water vapor upon gas measurement has been brought before the Association at a previous meeting and it is the intention of this paper to review the subject again with special emphasis placed upon its effect on measurements under a vacuum.

If reference is made to a table showing the percentage of water vapor at saturation under varying pressures, it will be noted that the amount of water vapor increases rather rapidly under pressures below asmospheric. For example, the saturation under atmospheric pressure at 75° amounts to 2.8 per cent by volume, while the percentage at 10 inches vacuum is 4.4 per cent and at 20 inches vacuum the volume of water vapor at saturation has increased to 8.6 per cent. It is to be understood that the gas is only saturated when it has remained in contact with water long enough to reach equilibrium or when the temperature of the gas has decreased sufficiently to reach saturation at that temperature and pressure.

It is necessary to make a distinction between water vapor and mist. Water vapor is a true gas, transparent like other gases, and in low concentrations at ordinary temperatures follows the general gas laws. Mist is really composed of an infinite number of particles of water in the liquid phase suspended in a gaseous medium. Since a given weight of water at ordinary temperature occupies some 1300 times as much volume as a gas does when in the liquid phase, it is obvious that any appreciable error caused by water in measuring gas refers to water vapor and not to mist.

The errors introduced by the presence of water vapor in the measurement of natural gas have two sources. The first lies in the determination of the specific gravity of the gas as it exists in the line, which is a factor in the measurement by the orifice meter. Since it is virtually impossible to duplicate the saturation of the gas in the line when determining the specific gravity, as for example, with the Edwards Balance, it has become the general practice to remove the moisture by means of a suitable chemical before introducing the sample. Since water vapor has a specific gravity of .61 the effect of this error is more pronounced in the case of wet gas which has a higher specific gravity than with dry gas which more nearly approaches the specific gravity of the water vapor. To use a rather exaggerated example, let us assume that we have a wet gas flowing through a line at a temperature of 80° and under a pressure of 15 inches of mercury vacuum. Let us also assume that this gas is saturated with water vapor and the specific gravity, as determined by the ordinary Edwards Balance method, is .90. If it were possible to determine the specific gravity before the water vapor was removed we would find that instead of the reported .90, the correct specific gravity would be .88, introducing an error of 1.2 per cent in our meter coefficient. This example will serve to show the possible magnitude of the effect of water vapor on the specific gravity of the gas.

The second and by far the most important source of error of measurement in the presence of water vapor, lies in the introduction of a varying amount of a foreign material which is measured along with the gas. If all gas contained the same amount of water vapor it would be a simple matter to make the necessary correction, but unfortunately, the percentage of water vapor varies markedly with temperature and pressure. The effect of this change in water vapor saturation is perhaps most noticeable in an absorption plant gathering its wet gas under a vacuum and treating it under a pressure. There is a shrinkage in volume due to the condensation of water vapor in this process of 4.5 per cent in an average case. Such

* Presented before the Southern California Meter Association, October 24, 1929.

an error, if the proper correction is not made, tends to give a low plant efficiency and show an abnormal line loss between the plant and the field.

It is thought that it would be of interest to present an actual case of the effect of water vapor at one particular plant.

At this plant the wet gas was measured at an average temperature of 78° under a vacuum of 12 inches mercury. The percentage of water vapor corresponding to complete saturation under these conditions was 5.3 per cent as obtained from charts. Tests were made by the wet and dry bulb method and the actual saturation averaged 4.15 per cent, representing a relative saturation of 78 per cent of the theoretical complete saturation. The wet gas as metered on this particular day amounted to 5,798 M cu. ft., giving 241 M cu. ft. of water vapor metered as wet gas. At the same time tests were being conducted at the various wells in the field supplying the plant with the wet gas. The results of these tests ranged from 2.2 to 6.8 per cent saturation of water vapor. The weighted average, however, gave a value of 4.22 per cent, which compares favorably with the figure of 4.15 per cent obtained at the plant. During the day a check was kept on the amount of water recovered from the scrubbers. Also tests were made on the dry gas to determine the amount of water vapor leaving the plant. The volume of water entering the plant in the wet gas was calculated to be 1,205 gallons. Of this amount 240 gallons left the dry gas, leaving 945 gallons to account for as condensate. Actually, 1,046 gallons of water were collected in the scrubbers, which serves as a fair check on the tests. Assuming the 1,046 gallons of condensed water to be correct, we will note that the shrinkage through the plant due to water vapor would amount to 186 M cu. ft. or 3.2 per cent of the wet gas entering.

In conclusion, it is hoped that this example will serve to stress the importance of water vapor in the measurement of gas, particularly under a vacuum, and it is hoped that further work under more widely varied conditions may serve to establish some standard means of testing and correcting for water vapor.

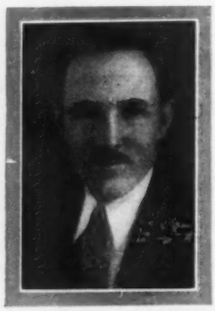
Methods *for* Computing Orifice Meter Charts; *The* Square Root Planimeter

By R. F. ANGELL

*Union Oil Company of California**

PART I.

GENERALLY speaking, the computation of flow meter charts, by present day methods, involves considerable office work, with many inherent inaccuracies and many possibilities of error. Already several kinds of integrating flow meters are on the market and it appears logical to expect further progress along this line. It is predicted that in the future all orifice meters will be self integrating and totalizing, thus saving considerable office work and eliminating many possibilities of error. One recent advancement and time saver in the computation of orifice meter charts is the square root planimeter, and this device will be discussed in this paper.



R. F. Angell

The computation of orifice meter chart records is based on the following equations:

For Compressible Fluids

(1) $$Q = C\sqrt{HP}$$

For Non-compressible Fluids

(2) $$Q = C\sqrt{H}$$

Q = Quantity (which is a rate).

C = Coefficient (This figure includes several constants and is calculated from data involving some 9 or 10 conditions regarding the orifice, the meter, the meter connections, the flowing conditions, etc.—all of which must be known).

H = differential pressure in inches of water as recorded on the meter.

P = absolute pressure (The absolute pressure or gauge pressure is recorded on the chart, in the case of the measurement of compressible fluids).

The above formula gives instantaneous values of the rate of flow from corresponding instantaneous differential and static pressure readings.

It can readily be seen that what is desired is a device which could take $\sqrt{H}$ factors and $\sqrt{HP}$ factors for infinitely small time periods and average or total these factors for the time length of the chart or any time length desired.

The equation for total, Q, for time period, t, becomes,

(3) $$Q = C \sum_{0}^{t} \sqrt{HP}$$

(4) $$Q = C \sum_{0}^{t} \sqrt{H}$$

Equation (4) can be evaluated accurately by means of the square root planimeter, which will be discussed later.

Equation (3) can be evaluated accurately by means of extension tables and by means of the Weymouth Compound Integrator. The first procedure of step-by-step calculation requires considerable time but permits of any degree of accuracy desired. The Integrator method, theoretically, gives an exact value of the integral expression and considerably reduces the time necessary for the calculation by the extension method. It requires two men to operate the instrument and it is not in common use. A further investigation into the compound integrator method is to follow at a later date.

Getting to the field problem as it stands today, the actual averaging, reading or obtaining the H and P factors from the chart, seems to be the most difficult phase of the computation. It can be and usually is carried out by either of the several following methods. The method adopted is usually a compromise between accuracy, field conditions, convenience, and expense, and all of the following methods are in use today. The computation of orifice meter charts necessarily divides itself into two separate classes, namely the computation of single-pen or single-record charts, as used with meters measuring non-compressible fluids or compressible fluids with steady pressure conditions, and the computation of two-pen or two-record charts as used with meters measuring compressible fluids, where it is necessary to have both static pressure and the differential pressure to calculate the flow. In the following methods we will refer to them as single record charts and two record charts.

Method I: The chart records for the 24-hour period can be averaged by eye and these 24-hour averages used in equation (1) or (2). This method is satisfactory when changes in flow or pressure are slight and these changes can be easily taken care of in the average.

Method II: The chart record or records can be averaged by 1-hour periods, the extensions $\sqrt{H}$ or $\sqrt{HP}$ of these hourly averages listed and totaled and the total multiplied by the hourly coefficient. This is a good method but takes considerable time and necessitates the handling of many figures with the ever present possibility of error. This is the method used by most gas companies in southern California.

Method III: The chart record (single or two-pen) can be averaged by 15 minutes or half-hour periods, and computed as in II. This method is more accurate than either method I or II and is often necessary in a widely varying chart. This method, however, takes too much time and increases the number of figures handled and thus the possibility of error.

Method IV: When the chart records do not vary over 5 per cent for the period for which the flow is to be calculated, a radial planimeter can be used to obtain their averages. The chart is then computed as in Method I. This method is somewhat mechanical and does eliminate some of the personal element, but necessitates a conversion from planimeter reading to chart reading. This conversion is made with a graph or table, especially prepared for each kind of chart. This naturally necessitates the handling of more figures and this is a disadvantage. This method, like Method I, has the inherent inaccuracy of obtaining the square root of the average instead of obtaining the average of the square roots.

* Presented before the November 21 meeting of the Southern California Meter Association.

Method V: The Square Root Planimeter Method.

The square root planimeter is a device similar in construction to the radial planimeter but is so constructed and calibrated that for one kind of chart it will give the square root of the distance from the zero circle of the flow chart to the record line being traced.

In the computation of single record charts, this method is 100 per cent basically accurate, and is herewith recommended. This method has the advantage of being mechanical and reducing the number of figures handled and also saves considerable time. This method seems the most logical method to adopt when charts are calculated in a central office and numerous charts of the same kind are handled. For direct reading charts this planimeter can be made to read direct in terms of the charts, so that chart constant and planimeter constants are the same.

The flow calculation becomes,

Q = differential pen planimeter reading x a constant.

In the computation of two record charts the square root planimeter is unfortunately not 100 per cent basically accurate, because the summation of the square roots of HP does not equal the summation of the square roots of H times the summation of the square roots of P, but is more accurate than the radial planimeter method and can be used safely with many two-record charts A test of its accuracy was made; see Part II, Test 2.

PART II.

A brief Discussion of Planimeters.

Generally speaking, a planimeter is an instrument for making a geometrical measurement of a plane surface. Planimeters are divided into several classes as follows:

1. Polar planimeters—used to measure the areas of irregular plane surfaces.

2. Radial planimeters—used to average the radius of a circular chart record and thus give the average value of a circular chart record in terms of an average temperature or pressure. A conversion chart or table is necessary to convert the planimeter reading to the average temperature or pressure reading.

3. Square root planimeters—used to measure the average square root of the distance from the zero circle of a flow chart to the line being traced. These planimeters can be used only with one kind of chart for which they have been calibrated.

Radial and square root planimeters also fall into two types as follows:

In the one type the chart revolves under the tracing point, the chart hub moving in a slot.

In the other type the tracing point moves around the chart, following the flow record, somewhat similar in manipulation to the polar planimeter.

Both types have their advantages. In this investigation the former type was used.

Part II—Test No. 1

A blank meter chart was obtained and an imaginary differential flow record drawn on this chart by hand. This record was made to show extreme changes in differential pressure, so as to magnify the comparison of errors in the different methods and to show the possibility of saving time in computing charts.

Flow conditions were assumed to accompany the chart record and the imaginary flow record calculated by the four methods shown in Table No. 1.

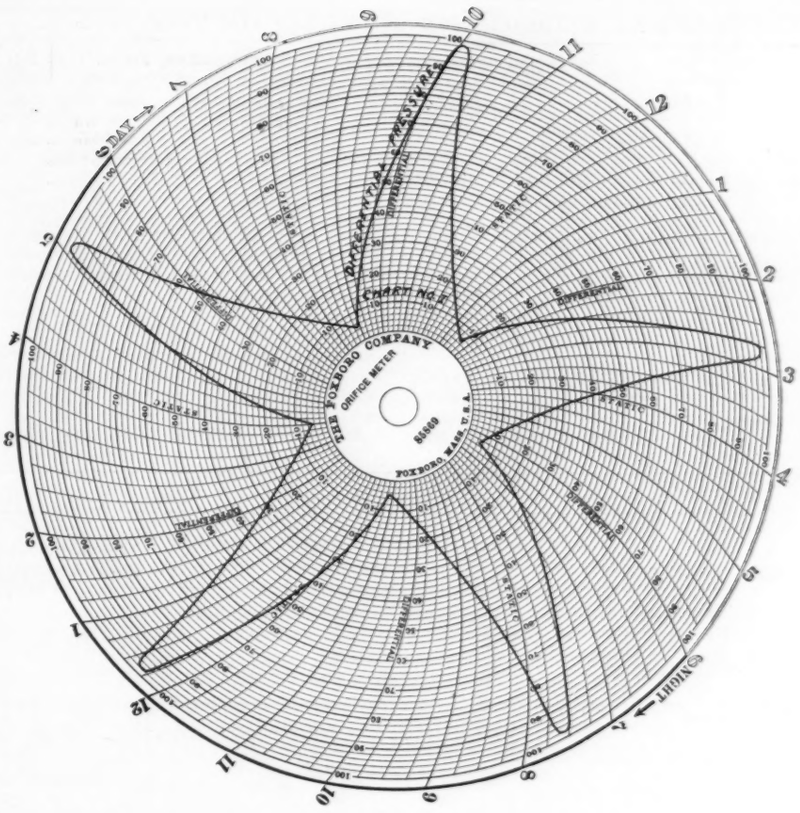


Chart No. 1

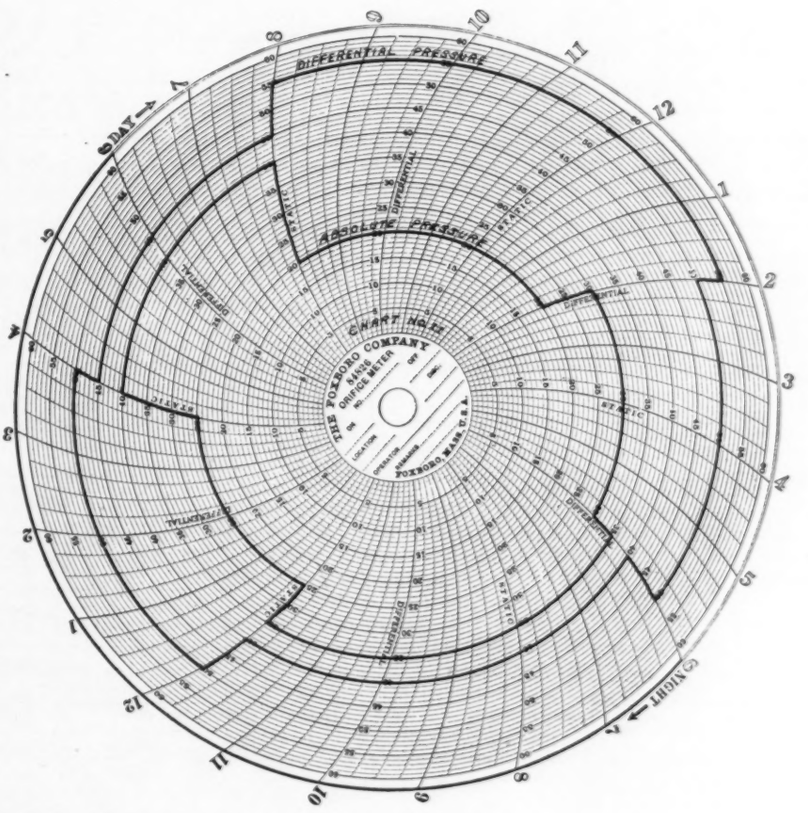


Chart No. 2

TABLE NO. 1. TABULATION OF RESULTS FOR TEST NO. 1

No.	Method	Gallons per Day as Computed from Chart	% Error Assuming Method No. 1, 100% Accurate	Appx. Time Required to Compute Flow Rec.
1	15 Min. Averages	58,040	.....	40 Min.
2	Hourly Averages	58,900	+1.48	20 Min.
3	Radial Planimeter	62,050	+6.91	15 Min.
4	Sq. Rt. Planimeter	57,830	—0.36	10 Min.

Remarks:—Method No. 1 was assumed 100 per cent accurate because we were especially checking the accuracy of the planimeter methods, and without a square root planimeter, method No. 1 is the most accurate method generally used. Method No. 4 is perhaps more nearly 100 per cent accurate.

Part II—Test No. 2.

To test the accuracy of both the radial and square root planimeters in computing two record charts, a blank chart was taken and an imaginary absolute pressure line and differential pressure line drawn on the chart. These records were drawn so that the flow could be accurately computed by the extension method.

An hourly coefficient of 1 was assumed and the chart calculated as in the previous test. See Table No. 2.

TABLE NO 2. TABULATION OF RESULTS FOR TEST NO. 2

No.	Method	Cu. Ft. Per Hr. C=1	% Error— Method No. 1 100% Accurate
1	Extension Method	889.62	.....
2	Radial Planimeter	903.57	+1.54
3	Sq. Rt. Planimeter	895.54	+0.67

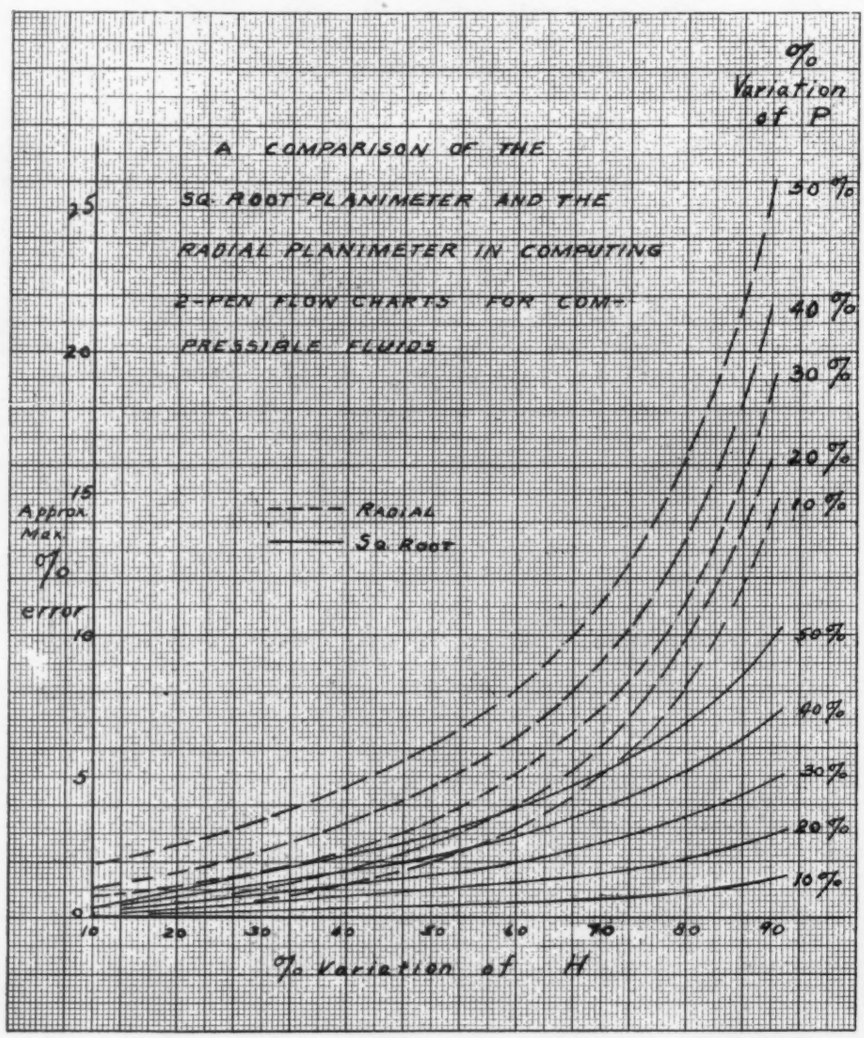

% Variation of P
A COMPARISON OF THE SQ. ROOT PLANIMETER AND THE RADIAL PLANIMETER IN COMPUTING 2-PEN FLOW CHARTS FOR COMPRESSIBLE FLUIDS
Approx. Max. % error
---- RADIAL
——— SQ. ROOT
% Variation of H

Fig. 1

This test showed that the radial planimeter could not be recommended for use in calculating two-pen flow charts. In view of the big saving of time it did encourage further investigation as to the use of the square root planimeter in computing two-pen flow records. Many varying conditions both as to differential pressure and absolute pressure were taken, with the accompanying graph (Fig. 1) as a result. It was found that variations for 12-hour periods gave the largest errors. The relative position as to the time the variation occured on the chart made no difference in resultant quantities as calculated by the planimeters.

Following are the equations which represent the three methods compared. The extension method is the exact method in this comparison, because with the chart records assumed it was possible to evaluate these records for exact time periods.

Extension or exact method

(5)

$$Q = C \sum_{0}^{t} \sqrt{HP}$$

Radial Planimeter method

(6)

$$Q = C \sqrt{\sum_{0}^{t} H \times \sum_{0}^{t} P}$$

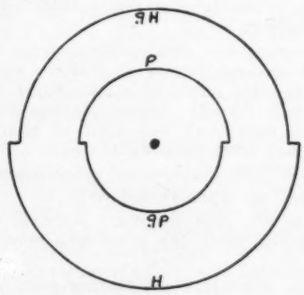
Square Root Planimeter method

(7)

$$Q = C \sum_{0}^{t} \sqrt{H} \times \sum_{0}^{t} \sqrt{P}$$

Sample Calculation as used in preparing graph:

10% Variation in absolute pressure (P)
10% Variation in differential pressure (H)
C=1



1. Exact Method

$$Q = 12\sqrt{.9H \times P} + 12\sqrt{H \times .9P}$$
$$= 22.77\sqrt{HP}$$

2. Square Root Planimeter

$$Q = 24\left(\frac{\sqrt{.9H} + \sqrt{H}}{2}\right) \times \left(\frac{\sqrt{.9P} + \sqrt{P}}{2}\right)$$
$$= 22.79\sqrt{HP} \qquad \text{error} + .09\%$$

3. Radial Planimeter

$$Q=24\sqrt{\frac{.9H+H}{2}}\quad\sqrt{\frac{.9P+P}{2}}$$

$$=22.80\sqrt{HP}\qquad \text{error}+.13\%$$

30% Variation in absolute press. (P)
70% Variation in differential (H)
C=1

1. Exact Method

$$Q=12\sqrt{.3H\times P}+12\sqrt{H\times .7P}$$

$$=16.61\sqrt{HP}$$

2. Square Root Planimeter

$$Q=24\left(\frac{\sqrt{.3H}+\sqrt{H}}{2}\right)\times\left(\frac{\sqrt{.7P}+\sqrt{P}}{2}\right)$$

$$=17.06\sqrt{HP}\qquad \text{error}+2.71\%$$

3. Radial Planimeter

$$Q=24\sqrt{\frac{.3H+H}{2}}\quad\sqrt{\frac{.7P+P}{2}}$$

$$=17.84\sqrt{HP}\qquad \text{error}+7.41\%$$

CONCLUSION

It is recommended that the radial planimeter be confined to its own field of use, that of obtaining average temperature and pressure readings, and that it not be used to compute flow charts. It is recommended that the square root planimeter be used to compute single record charts.

Generally speaking, the square root planimeter introduces an error when used to comput two-record charts; however, there are many cases when it is advisable to use this device in computing two-record charts. It is urged that further work be carried on with the view of perfecting and bringing to general use a compound integator for two-record charts.

1929-1930 Calendar

Ninth Annual Gas Meter Short Course—Iowa State College, Ames, Iowa, December 3-6, 1929.

Southern California Meter Association—December 27, 1929.

Utilities Association Secretaries of the United States—Chicago, December, 1929.

Arizona Utilities Association, Pacific Coast Gas Association—Joint conference, Arizona Biltmore, near Phoenix, April, 1930.

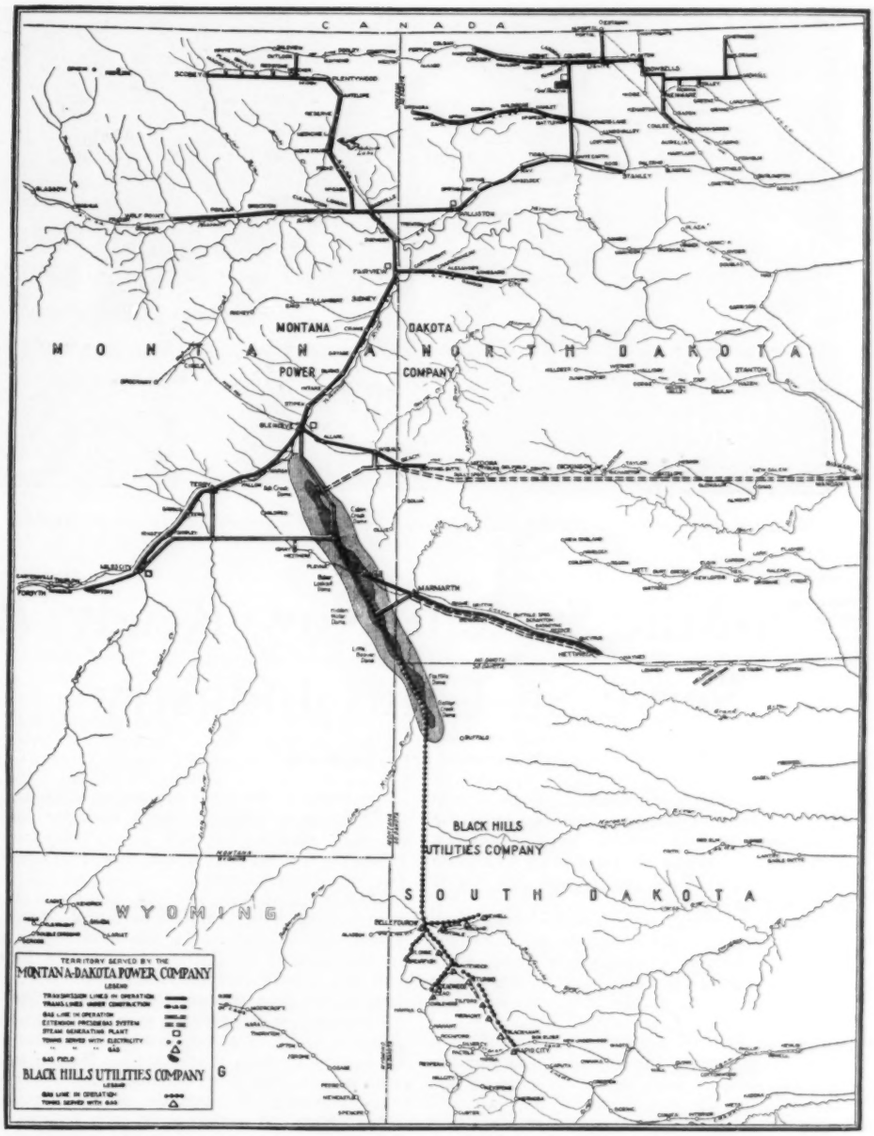
Mid-West Gas Association—Waterloo, Iowa, April 14-16, 1930.

Southern Gas Association—Savannah, Ga., April 22-24, 1930.

Canadian Gas Association—Halifax, Nova Scotia, June 24-25, 1930.

Pacific Coast Gas Association—Huntington Hotel, Pasadena, Calif., September 9-12, 1930.

American Gas Association—Municipal Auditorium, Atlantic City, N. J., October 13-17, 1930.


C A N A D A
MONTANA
POWER
COMPANY
DAKOTA
M O N T A N A
N O R T H D A K O T A
BLACK HILLS
UTILITIES COMPANY
S O U T H D A K O T A
W Y O M I N G
TERRITORY SERVED BY THE
MONTANA-DAKOTA POWER COMPANY
LEGEND
BLACK HILLS UTILITIES COMPANY

Map showing the territory now being served by the Montana-Dakota Power Company in eastern Montana and the Dakotas, together with planned lines to North Dakota.

Montana-Dakota Power Co. Planning Line *to* N. Dakota

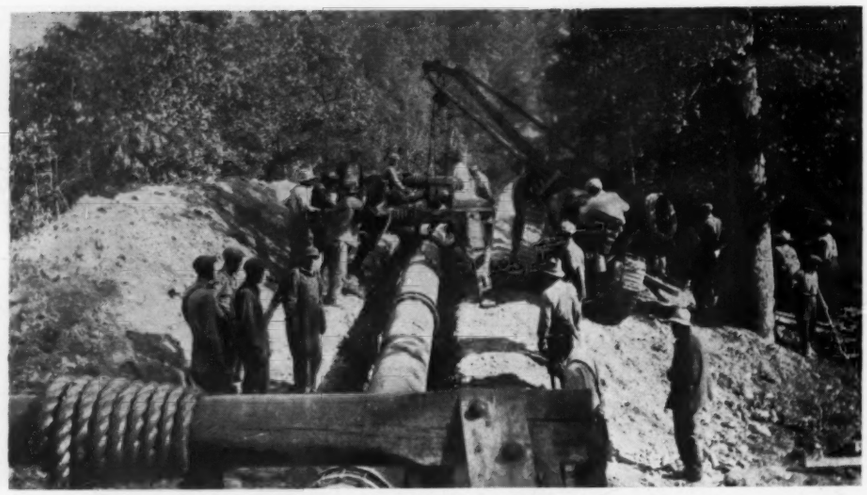
MONTANA-DAKOTA POWER COMPANY, with headquarters in Minneapolis, Minnesota, is taking active steps toward the construction of a natural gas transmission line from the company's gas fields in Montana to cities of North Dakota. W. L. Hayes, general sales manager for the Minnesota Northern Power Company, parent organization of the Montana-Dakota Power Company, makes the following statement in a letter to *Western Gas:*

"The line north of Williston will go through the towns served with our electric line as far as Fairview and from Fairview to Williston will go across country in order that all the towns will be served between Fairview and Glendive. Our plans are complete for the construction of these two lines and work on both lines will start early in the spring. The Williston line should be completed by the first of August. The Bismarck line will probably be completed about the first of September. The line to Bismarck as we now plan it will be a 12-inch Dresser Coupling line and the line to Williston is contemplated as an 8-inch line, but this plan has not been definitely settled.

"At the present time we are building a pipe line into Malta and Glasgow, Montana. Service should be available in both of these towns by December 15. The gas for both towns is coming from the Bowdoin structure, which is located north and east of Malta. If our drilling operations on this structure develop a large supply of gas, this service will be extended to other towns in the surrounding territory."

AZTEC, NEW MEXICO, WILL HAVE NATURAL FROM NEAR-BY WELL

Aztec, New Mexico, will be supplied with natural gas through a line from the Dorothy Oil Company's well near the town. F. M. Burt secured the franchise for the Aztec Oil Syndicate.



Construction activities on the Mississippi River Fuel Corporation's line from the Monroe fields in Louisiana to St. Louis, Missouri, and points en route.

526-Mile System Now Ready *to* Serve St. Louis Industry

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homa Contracting Company. The Mississippi River Fuel Corporation contracted the laying of the two branch lines in the St. Louis district to the Frazier-Davis Construction Company of Missouri, and the Monie Contracting Company.

The five compressing stations were built by the engineers of the Mississippi River Fuel Corporation, concurrently, and were finished almost at the same time. The foundation work at the five stations was done by the Foundation Company of America. It is of more than passing interest that excepting for the types of gas engines and compressors used, there being two types, the five stations are identical in plan and equipment. Such an arrangement simplifies the construction work and shortens a description of the stations. The field station, called Perryville Station, is located at the southern end of the 22-inch main line near Perryville, Louisiana. Approximately 88 miles north is Glendale Station, near Star City, Arkansas. In turn, and at about the same distances, are West Point Station, at Kensett, Arkansas, Biggers Station at Biggers, Arkansas, and Twelve Mile Station, near Fredericktown, Missouri.

Each of the five stations has the same equipment; there are six 1000-horsepower twin-tandem, double-acting gas engine driven compressing units per station, space being allowed for future expansion. The cooling water for these units, obtained either from drilled wells or natural surface sources, passes through the jackets from an overhead tank of 100,000 gallons capacity. Water is discharged into this tank by centrifugal pumps, driven by motors or automotive type gas engines. The discharge gas from the compressors is cooled in atmospheric pipe coolers.

At two stations, Perryville and West Point, electric power is purchased, gas driven generators being provided to take care of power failure. Three-phase, 220-volt, alternating current generators, directly driven by four-cylinder gas engines, supply electric power for pumping and lighting requirements at the three remaining stations.

There is a well equipped machine shop at each station, as well as a warehouse, office, locker room and six dwelling houses for resident employees.

The natural gas for the St. Louis line comes from both the Richland and Monroe fields in Louisiana. As the well pressures in the former field are exceptionally high, this gas passes directly through the 25-mile line to the field station, Perryville. Here it may either be compressed with gas from the Monroe field to a pressure of 350 pounds, or it may by-pass that station. At the next station the pressure will be boosted from approximately 130 pounds to 350 pounds. This procedure continues at each booster or compressing station, until the gas is delivered at the northern end of the line, Meramec Junction, near St. Louis.

At this point is located the regulating station, where the pressure in the main line is reduced by regulators, and the gas flows under a diminished pressure into the two branch lines. The gas dispatcher's office, the necessary orifice runs and meters for measuring the volumes of gas being handled, and the central gas testing laboratory are also situated at Meramec Junction. The gas dispatcher receives here over the company's private telephone system the usual hourly pressure reports from the various compressing stations.

The Mississippi River Fuel Corporation secures its supply of natural gas from long-term contracts with the producing companies which have the major portion of the gas reserves in both the Richland and Monroe fields, and in this way an ample supply for the future is assured. If the well pressures in the Richland field drop to such a point that gas cannot be delivered directly to the Perryville Station, plans have been drawn and property acquired for a compressing station in this field. The companies supplying natural gas are: Interstate Natural Gas Company, Inc., and Hope Producing Company, subsidiaries of Standard Oil Company (New Jersey); Columbian Carbon Company; United Carbon Company; the Palmer Corporation of Louisiana; Industrial Gas Company, subsidiary of the Electric Power & Light Company; and Moody-Seagraves Gas Company, Inc., subsidiary of United Gas Company.

The natural gas transported to the St. Louis district is available only for industrial consumption. It is not offered for domestic use for the reason that the requirements of the City of St. Louis and surrounding cities for gas for domestic use would be far beyond the supply of gas available or the carrying capacity of the company's pipe line. This is rather an unusual situation. The Mississippi River Fuel Corporation is selling gas directly to many industries, and it has entered into agreements to sell gas to the Missouri Industrial Gas Company, affiliated with the Laclede Gas Company, and to the Cahokia Manufacturers Gas Company, affiliated with the Illinois Power & Light Company, for the distribution of natural gas by them to various industries located on their respective lines on both sides of the Mississippi River. In this manner, natural gas will be available to practically all the industries in the St. Louis industrial area with a minimum construction of distributing systems.

Some idea of the diversified industries in the St. Louis district may be obtained from the list of customers already applying for natural gas. Among others, there are steel companies, glass plants, enameling plants, brick companies, terra-cotta plants, rolling mills, a sugar refining plant, a tube mill, an ammunition plant, a malleable castings company and a non-ferrous secondary metal refinery.

Natural gas will be made available to many communities in Louisiana, Arkansas and Missouri, along the main line, through arrangements for distribution consummated with the Arkansas Power & Light Company, the Arkansas Natural Gas Company and the Missouri Natural Gas Company, the Mississippi River Fuel Corporation delivering gas wholesale and the buying companies undertaking to distribute the natural gas to their customers in communities where they are not equipped to operate plants.

Soil difficulties encountered in the construction of the St. Louis line are apparent from this view along the route of the carrier.

Economy *in* Natural Gas Production

ing of the problems involved being evident in the regulatory steps taken. Louisiana has undertaken to regulate wisely in the interests of everyone, and the results being obtained are a striking example of able administration.

The Louisiana Department of Conservation of Natural Resources has done and is doing a creditable work. Apart from the actual gauging and checking of all gas wells in the state, and the scheduling of the permissible volumes to be taken during a month, and during an allotted number of hours in a day, the Department acts in the capacity of umpire to promote frank and open discussions of all problems by the various parties concerned. It has been an astonishing and refreshing development to observe the spirit of cooperation and friendliness engendered after men get to know their fellow operators. To be sure, the large companies have given enthusiastic and stabilizing support, contributing ideas, men, money and materials where and as deemed expedient.

There is no attempt to curb the splendid spirit of pioneering and trail blazing—rather, the attitude of the Conservation Department is one of helpful and intelligent consideration to the prospector, to the property holder, and to the producer and marketer, as well as to the general public of the entire country. That policy is constructive.

Proper publicity has been given in various bulletins to the development and withdrawal in the Monroe gas fields. It is sufficient to call attention to the fact that there is a seeming known gas reserve of around 2,000 billion cubic feet in the area at the present time, or approximately two-thirds of the estimated original volume. The various inefficiencies and wastages in the field have been and are being cared for with a program of permissable withdrawals based on acreage and pressures and the proper care and handling of the individual wells.

A similar study of certain other areas reveals some interesting features. There are a few evidently supportable conclusions to be drawn. For illustration, the Spring Hill Sarepta gas area in Webster Parish, Louisiana will be considered. This strictly gas area was discovered in 1920 in the prevailing manner of those days, by having a "wild-cat" well blow in unexpectedly and promptly crater despite all attempts to subdue it. The first commercial well was brought in during the latter part of 1921.

At that time an estimate of the potential gas reserves of the Spring Hill-Sarepta (Gleason) area indicated a total of some 335 billion cubic feet from an area of 50 square miles, of which amount 268 billion were considered recoverable.

As of July 1, 1929, available estimates give a total withdrawal of around 80 billion cubic feet, an estimated wastage of 18 billion due to crater and irresponsible blowing of wells, making a total recovery of some 100 billion cubic feet. It is estimated that some 15 billion cubic feet, are still available. This will mean a total withdrawal of approximately 115 billion cubic feet, from an area which gave promise of producing 268 billion.

What happened to the balance of this gas is a proper query. Without attempting to arouse controversy there are certain apparent facts looming in bold relief. The area was drowned out by the ever present salt water sand which lies directly under most oil and gas horizons. Though a lack of knowledge, lack of vision, disregard of warning signals,

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improper handling of various wells, and improper drilling in of certain wells to begin with, the untimely destruction of this reserve was brought about. Most of these problems are subject to correction by proper drilling, by studied development of the gas area, by schedules of withdrawals of gas, and by an immediate recognition of the customary salt water encroachment danger with the obvious control required. Furthermore, a method of guaging and of relieving the gas wells of fluid must be standardized in order to prevent the present wastage of gas and the harmful possibilities of salt water encroachment through blowing of wells for any reason whatever.

Attention may also be called to the Carterville-Spring Hill area in Louisiana, which is at present producing gas from the so-called Giles sand. As of June 30, 1929, there was a total of some 55 wells drilled in or deepened in Spring Hill, and 30 wells drilled in the Carterville section proper, making 85 gas wells in all. Assuming for computation an average of $17,000 drilling cost per well gives an expenditure of around $1,500,000.

On the basis of the known decline in closed in pressures, two-thirds of the gas has been withdrawn. This metered withdrawal totals some 15 billion cubic feet, having a potential reserve of some 8 billion cubic feet, and a more probable extraction of perhaps 5 billion. In other words, the area contained possibly 30 billion cubic feet of marketable gas. Placing a common price for gas at the wells of 4 cents per thousand cubic feet, at 10 ounces base, the gas reserve can be set up at an appraisal of $1,200,000. It is true that the ultimate volume of this reserve was developed only through the drilling campaign of putting down the wells; it is also true that even an approximate check up would have developed sufficient data to convince anyone that the drilling operations actually completed in the area were largely loss and that the area would only be subject to a speedier decline because of the overdevelopment. Foresight and study could have prevented this loss in money, so vital to everyone in the business.

On the threshold of the development of another very large potential gas area, the so-called Richland Parish gas field, it would seem logical to try in some way to stem the possibility of loss of money through injudicious drilling, and the loss of gas because of improper control. The Richland Parish gas field at the present time covers an area of some 90 square miles, and may be estimated to contain a reserve of some 1,200 billion cubic feet of gas. Allowing 4 cents per thousand cubic feet at the wells as a fair appraisal value of the gas, the reserve may be put at $48,000,000. If only two-thirds of this gas is extractable, which is a very conservative assumption, the value of the reserve is therefore some $32,000,000.

To date a total of over 100 wells have been drilled in the area, most of the drilling being confined to localized sections—at a likely total expenditure of say some $2,000,000.

For over a year after discovery very little gas had been withdrawn from the field. which has resulted in the dangerous situation of having a large number of high pressure gas wells closed in as a constant menace to the safety of the area. It is to be noted, however, in this connection, that very few instances are on record where gas wells properly drilled and gated and attended to, have given trouble. At present several craters have developed in the area, with a consequent loss of gas and pressure; these craters could have been prevented if all the precautions which should be enforced by the operators themselves with high pressure wells had been rigidly adhered to. The extent of the crater damages to the reserve will not be apparent for some time, but an extensive delay in closing them in by some method yet to be devised, will certainly affect the reserve by drawing in an untimely salt water encroachment, thereby pocketing off gas measures; and in turn, the hopeless effort to again discover these measures will result in dispersing their gas reserves.

There are certain factors fairly well established which may be set up as possible recommendations of safe practice. The proper weight of casing and fittings has been given consideration, and a standard has been developed which is adequate. The complete cementing of each string of casing has been advocated—albeit no salvage of casing will be possible (through present methods.)

The most significant and important recommendation, with due consideration of the strata involved, favors the installation of syphons on every well, at the outset.

Tubing is recommended for these reasons:

1. To prevent possible cratering of the well.
2. To keep out salt water.
3. To promote longevity of the reserve.
4. To permit more definite schedules of withdrawal.
5. To eliminate the needless, ineffective and harmful practices of blowing the wells in attempting to get rid of fluid.
6. To effect a standardized method of gauging open flows without opening the wells.

The use of syphons and automatic drips has long been advocated by the Bureau of Mines and has very largely become standard practice in the various areas. Because of the before mentioned salt water stratas, the tubing of all wells would prove especially effective in Louisiana, in the vast majority of instances. The evolution of the industry will shortly demand the adoption of this method of control because of the obvious economies effected. There has not been a case of failure on record where the installation of tubing was handled by experienced operators, and the stubborn resistance to its universal adoption is largely due to lack of visualization and a harking back to earlier but now obsolete standards of good practice.

With the adoption of methods for gauging gas wells without blowing them, representing fair gauges of the respective volumes and closed-in pressures, much will have been accomplished in conservation of our natural gas reserves; and by establishing operating ratios of back pressure control of the wells the life of these reserves will have been considerably lengthened.

As another problem in the offing there occurs the question of the proper drilling of gas acreage. Natural gas being migratory and readily exhaustable, the acreage must not be handled as oil acreage has been developed and expolited. At no distant day this matter of control of drilling, and the absolute elimination of the attempted offset evil, will seek competent and lasting solution.

Burning Refractory Materials *with* Natural Gas

air-gas ratio was not correct, nor was it consistent; a gaseous combustion was taking place within the ware, and unburned fuel was escaping through the flue and stack. It so happened that it was very convenient to use a blower on the low pressure burners and after this installation was made, the gas pressure was cut to 1 pound per square inch, by using a regulator at the kiln, and the air was set at 4 ounces.

The results of these tests showed a consumption of 6000 cubic feet of gas per ton of ware burned, the tonnage and kind of material being the same as was fired in the first test. A flue gas analysis was also made and the test showed no CO and 5 per cent excess air, which can be considered a very favorable burning condition from the standpoint of quality and economy.

Refractories as a whole can be burned with an exceedingly low excess air with no particular harm to the products, except that sometimes the appearance may be criticized due to iron spots and discoloration.

There are, however, products that require a highly oxidizing furnace atmosphere. At the plant just mentioned, a product was being burned in a tunnel kiln requiring 30 per cent excess air. This meant that the kiln, which was designed to burn the ordinary refractory with 2 to 5 per cent excess air and which gave satisfactory results for ordinary refractories, had to have its damper and draft controls completely changed to meet the new requirements.

SILICA BRICK

In connection with serving gas fuel to the various branches of the industry, there is always some outstanding feature that deserves special mention, and this fact is particularly true in the manufacture of refractories. For the past two years the demand for silica brick has increased very rapidly in southern California and is continuing to do so at the present time. In consequence, many new plants have sprung up devoting their entire output to the manufacture of this ware.

The burning of siliceous brick has presented perhaps as many difficult problems to solve, if not more, than any other class of refractory burned in this section of the country. This is contrary, however, to the general belief throughout the eastern states manufacturing the same product, that more accurate fundamental tests of the raw materials have been made and more is now known of the proper manufacture or application of silica refractories than any other common refractory. The troubles experienced have been caused by the very high rate of expansion, which makes this material very sensitive to temperature fluctuations, both in the firing process and under service conditions. Unlike fire clay brick, silica brick expands permanently during firing because the final products, cristobalite and tridymite to which quartz converts upon heating, have a greater specific volume than quartz. The change in volume can amount to as much as 15 per cent, but rarely reaches that figure. Therefore, as would be expected, the true specific gravity of a silica brick is a good criterion by which to judge whether the brick has had proper heat treatment. The industrial significance of this work, as well as the experience of kiln burners, is that silica refractories should be heated slowly during the early stages of the burn, but held at a

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high temperature long enough to convert the silica, largely to cristobalite and tridymite, and be allowed to cool slowly below red heat in order to avoid the shattering of the bond.

Silica refractories have one outstanding characteristic which recommends them for wide use—namely, the ability to carry load at high temperatures. This characteristic is utilized in roof and arch construction. As silica is decidedly acid in character, it will stand up better in contact with acid than with basic slag. Moreover, it is the ideal material for lining such acid-process furnaces as the acid open-hearth and Bessemer converter. Its use is by no means limited to the acid field, however. Silica is employed as a roof material in virtually all metallurgical furnaces where extra high temperature is required, whether the process is acid or basic. The use of silica for lining lime kilns illustrates how a very acid refractory can be employed successfully in contact with a very basic substance, when both are far below their softening temperature.

Although the thermal expansion of silica refractories is objectionable in some services, it is put to good use in others; for example, where a gas-tight wall is required, or in 24-hour continuous high temperature work.

The outstanding objection to silica refractories in service where sudden temperature changes occur that brings the surface below red heat is the tendency to spall. The firing of this product has furnished the writer a good many interesting problems, the outstanding one being that of efficiently reaching the extreme high temperature required at the finish of the burn. Firing of a kiln with a capacity of 50,000 standard bricks (3x9x12-inch), or 150 tons of ware, usually requires about 212 hours to complete the burning process and requires approximately 1,300,000 cubic feet of 1125 B.t.u. natural gas.

The rate of gas consumption starts in the water smoking period the first day at approximately 640 cubic feet per hour and finishes at the vitrification period at the rate of 9000 cubic feet per hour, and a temperature around 2660° Fahr. is usually attained.

A flue gas analysis taken at the height of the burn should run at best condition as follows:

CO^2	10.3	per cent
O^2	.25	per cent
CO	0	per cent
Excess Air	2.5	per cent

The above data were taken as the average on several tests over a period of months on a round down-draft kiln.

The outstanding problem in the burning of this ware is the attaining of the last 200° of temperature. Invariably the gain is very rapid during the night firing and a loss occurs during the daylight hours. In a gain of 15 to 20 degrees at night, a loss of from 5 to 10 degrees can be expected the following day, and one can expect to experience this variation for the last two or three days of the fire even under most favorable firing conditions. The real problem, however, is the forcing of the burners to acquire sufficient soaking heat. One burner at the fire box is ample for water smoking and oxidation periods, or to attain a temperature of approximately 1700° Fahr. Then it has been found advisable to use three to four burners per fire box, depending upon the size of the kiln. This has proven a more satisfactory arrangement where atmospheric burners are used, due to the fact that the greater number of burners necessarily means that smaller drilling is used and the firing operations are considerably more flexible from the water smoking period to the height of the burn or vitrification period.

Without doubt low pressure air and gas burners of proper design and construction would give even greater efficiency and perhaps more flexibility. However, this is not always convenient and an industrial engineer many times is forced to make use of the available equipment. It has been the writer's experience that one should always try to utilize the customer's equipment, and go as far as possible with it, before making further recommendations.

At this particular time serious thought is being given to the equipping of a ceramic ware kiln with Surface Combustion equipment, which in the writer's mind will without question supersede all that has been done to date in this line of endeavor.

In conclusion it may be in order to add that in all ceramic plant investigation research as conducted by industrial gas engineers there are few rules and regulations that should be followed. Some problems of general interest upon which special data are to be gathered can be set up as follows:

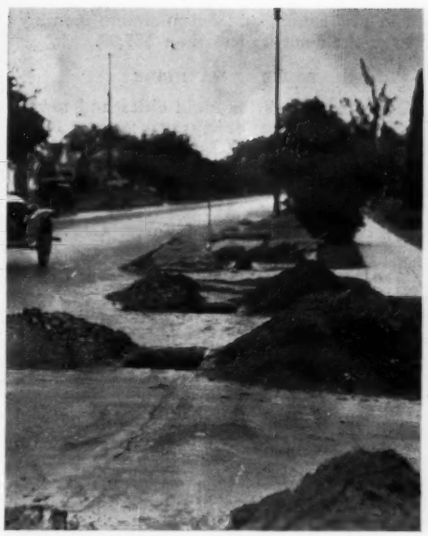
1. Heat distribution:
   (a) Temperature survey.
   (b) Draft survey.
2. Proper proportions of kiln.
3. Manner of setting ware to obtain best distribution of heat.
4. Open vs. closed firing.
5. Progress of combustion in kilns.
6. Induced vs. natural draft.
7. Laboratory control of firing practice.
8. Equipment for high-temperature measurements.

As for investigation, its aim is as follows: To increase the efficiency of burning conditions in the particular plants where tests are to be run and to obtain data that will be of value to the ceramic industry as well as to the gas fraternity. Aside from the problems inherent in the burning of different kinds of ware in different kilns, many of the plants and gas companies present special problems. There are three main objects that are to be considered in any manufacturing plant, wihch are as follows:

1. Production of better ware;
2. Conservation of fuel;
3. Increased kiln turnover;

and any one of these three may be considered as the major problem. Occasionally one will find that one problem will be stressed at the expense of others. For instance, it may become necessary in order to improve the quality of the ware to carry the kiln to a higher temperature or to soak for a longer period than is usual plant practice, even though additional fuel is required.

Natural gas without question has found its place in the ceramic industry due to the fact that positive control in all heating operation is absolutely necessary, and this fuel has proven to be of invaluable assistance in this respect; and it should be borne in mind that the same quality of dependability in performance is demanded of any heating agent which is to replace natural gas.



LEFT: Cleveland trencher in operation. Deep trenching was sometimes required on the Pacific Highway. CENTER: Construction of 4-inch high pressure belt line in Salem. RIGHT: Compressed air boring machine.

Extension Program Links Northwestern Cities

farm wish for modern equipment, and she hopes to obtain the convenience of a quick, infallible, and clean fuel.

The new gas rates in effect in Salem and Marion County, which are very attractive considering the old rates and service, are as follows (gas supplied under all schedules shall have a monthly average total heating value of 570 B.t.u.):

RESIDENTIAL GAS SERVICE

First 300 cubic feet, or less, per month for installations served by meters of less than 10 Light B capacity $1.00
(For similar initial charges for 10 Light B and large meters, see table of initial charges shown below.)
Next 3,700 cu. ft. per month..... $1.37 per M.C.F.
Next 6,000 cu. ft. per month..... 1.21 per M.C.F.
Next 30,000 cu. ft. per month..... 1.11 per M.C.F.
Excess over 40,000 cu. ft. per month.. 1.00 per M.C.F.

This schedule is applicable to gas supplied for residential purposes.

GAS SERVICE FOR ENGINES AND HOUSE HEATING

First 300 cubic feet, or less, per month for installations served by meters of less than 10 Light B capacity $1.00
(For similar initial charges for 10 Light B and larger meters, see table of initial charges shown below.)
Next 2,700 cu. ft. per month..... $1.21 per M.C.F.
Excess over 3,000 cu ft. per month.... .79 per M.C.F.

The initial charges will not apply on house heating service for months of July and August; the first 300 cubic feet used during each of such months will be billed at $1.21 per 1000 cubic feet.

INITIAL CHARGES—FOR FIRST 300 CU. FT.:

Meter Size	*Initial Charge*
Less than 10 Light B	$1.00
10 Light B and 20 Light	1.15
30 Light	1.40
20 Light B	1.55
45 Light	1.65
60 Light and 30 Light B	1.85
100 Light and 60 Light B	2.35
200 Light, 100 Light B and No. 5 Sprague	3.75
300 Light	5.25

The above schedule is applicable only to gas supplied for the operation of gas en-

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gines and for heating the atmosphere in building interiors to living temperatures. It is also applicable to gas-operated refrigeration equipment where gas is used exclusively for the major house heating requirements of the customer. Gas will not be furnished under this schedule for the purpose of providing hot water supply or for industrial air-heating purposes.

Two additional schedules, unique in the gas industry, were made up from the two basic schedules above.

COMBINATION RESIDENTIAL COOKING AND WATER HEATING GAS SERVICE—OPTIONAL RATE:

First 300 cubic feet, or less, per month for installations served by meters of less than 10 Light B capacity $1.00
(For similar initial charges for 10 Light B and large meters see table of initial charges shown below.)
Next 1,700 cu. ft. per month..... $1.37 per M.C.F.
Next 2,000 cu. ft. per month..... 1.21 per M.C.F.
Next 2,000 cu. ft. per month..... 1.11 per M.C.F.
Excess over 6,000 cu. ft. per month.... 1.00 per M.C.F.

INITIAL CHARGES FOR FIRST 300 CUBIC FEET:

Meter Size	*Initial Charge*
Less than 10 Light B	$1.00
10 Light B, and 20 Light	1.15
30 Light	1.40
20 Light B	1.55
45 Light	1.65
60 Light and 30 Light B	1.85
100 Light and 60 Light B	2.35
200 Light, 100 Light B and No. 5 Sprague	3.75
300 Light	5.25

This schedule is applicable to gas supplied to residences, apartments and flats, provided gas is used exclusively for the major cooking and water heating requirements of the occupants.

The minimum monthly charge under this schedule shall be $3.00. Upon written prior notice from the customer, the minimum charge will be waived for a period not exceeding two consecutive months in any year if the premises are unoccupied and no gas is used during such period.

COMPLETE COMBINATION RESIDENTIAL GAS SERVICE—OPTIONAL RATE:

First 300 cubic feet, or less, per month for installations served by meters of less than 10 Light B capacity $1.00
(For similar initial charges for 10 Light B and large meters see table of initial charges shown below.)
Next 1,700 cu. ft. per month..... $1.37 per M.C.F.
Next 2,000 cu. ft. per month..... 1.21 per M.C.F.
Excess over 4000 cu. ft. per month.... .79 per M.C.F.

INITIAL CHARGES—FOR FIRST 300 CUBIC FEET:

Meter Size	*Initial Charge*
Less than 10 Light B	$1.00
10 Light B, and 20 Light	1.15
30 Light	1.40
20 Light B	1.55
45 Light	1.65
60 Light and 30 Light B	1.85
100 Light and 60 Light B	2.35
200 Light, 100 Light B and No. 5 Sprague	3.75
300 Light	5.25

This schedule is applicable to all gas supplied to residences, apartments and flats, provided gas is used exclusively for the major cooking, water heating and house heating requirements of the occupants.

The minimum monthly charge under this schedule shall be $4.00. Upon written prior notice from the customer, the minimum charge will be waived for a period not exceeding two consecutive months in any year if the premises are unoccupied and no gas is used during such period.

Prepay meter rental is 15c per month.

A temporary office was maintained in a storeroom in Salem during the month of August for display, bills, service calls and general information. A portion of the Capitol Theater building at State and High Streets was leased for an office and refinished along modernistic lines. This office was ready for occupancy on September 1. A new all-metal and glass front was installed with show windows extending from the sidewalk level to the under side of the marquise, and a large Neon sign is hung over the entrance. The office is finished with silver-tinted paneled paper, fluted columns finished in silver, and black marbleized linoleum, with base of similar finish. The furnishings are specially selected and

finished to correspond to the modernistic decorative design. The office is dispaying the latest in gas ranges, water heaters, househeating equipment and refrigerators. Office manager, five salesmen and two clerks occupy the space at the rear of the office.

A storeroom at present houses fitters and service men. This room is also used for storage of pipe, meters, ranges, trucks and miscellaneous equipment. The personnel includes foreman and assistant, and six men for Utilization Bureau work. The Distribution Bureau work on mains and services in Salem is being handled by two foremen with crews varying in number from 20 to 150 men. The foremen and fitters, familiar with the company's policies and practices, were sent to Salem from Portland, labor being recruited from Salem and nearby communities.

INDUSTRIES

Salem is the center of a large berry and fruit district. The surrounding territory is noted for its cherry orchards. In 1928, the pack at the canning pants was 1,400,000 cases or over one-third of that of the entire state of Oregon. Among the principal manufacturing plants are the Phez Company, making juices, jellies and jams; The Hunt Cannery Company, canning fruits; Oregon Packing Company, packing fruits; Valley Packing Company, packing meats. The Oregon Pulp and Paper Company is a million dollar plant and the Spaulding Logging Company is a large box, door and sash plant. Sixty-three other industries, too numerous to detail, are brick, tile, concrete, lumber, globes, flouring, woolen and linen mills, iron foundry, cider and vinegar plants, fruit dryers, bottling works and rug factory. There are over 70 garages and 20 first class restaurants within the city limits.

The industrial use of gas in Salem holds promise of good business. Storage of fuel, for State institutions, and the heavy investment required, is a considerable item. From inquiries made thus far, the use of gas will be universal in all State buildings. These include the State Penitentiary, Asylums, Hospitals and Capitol buildings, housing all departments of the State Government. Other large structures in the city include the Willamette University, Sisters Academy, Capitol Business College, and private Normal School; four other institutions of learning are close to the business district.

Fuel bills (for solid fuel) now aggregate over $90,000 per year for the State Institutions. At the Chemawa Indian School, the solid fuel used costs approximately $20,000 per year.

Along the Pacific Highway are to be found many auto camps, inns, taverns and lunch stands, all anxious for gas service. Other fuels are expensive and storage space around such places is limited. A quick and sure fuel is required, and, from inquiries already received, we anticipate a heavy demand for gas service along the Highway. Proposed industrial installations for drying fruit and hops will be a very profitable off-peak business.

Industrial gas rates vary from $1.37 to 69c per M. C. F. for gas supplied for use in all miscellaneous commercial processes.

Gas supplied for drying and enamelling processes, varies from $1.37 to 59c per M. C. F. and the monthly charge shall not be less than $75.00 Practically the same rate applies to melting of metals, except that the monthly charge shall not be less than $42.50.

Similar rates are in effect for gas for commercial and industrial water heating and steam production, and the minimum monthly charge shall not be less than $25.00.

ROUTE OF MAIN LINE

The map shows the main cities and towns in the Willamette Valley adjacent to Portland. The Portland Gas & Coke Company now serves a territory bounded by Vancouver, which is four miles north of Portland; Gresham, nine miles east; Oregon City, 10 miles south; and Forest Grove, in the Tualatin Valley, 21 miles west.

The extention now completed serves Salem and way points. A future extension is contemplated to Newberg and McMinnville along the Capitol Highway route. A short lateral extension is proposed to Canby and Barlow; also to Mt. Angel and Silvertown. The longest main extension under consideration is one into the territory west of and south of Salem, serving Dallas, Monmouth, Independence, Albany and Corvallis. The last named city is the home of the Oregon State College. Eugene, the home of the University of Oregon, is now supplied with gas by the Northwest Cities Gas Company.

A 10-inch main extends from a 10-inch high pressure main (now in place in the southwest district of Portland) southerly on County roads through the Lake Grove district to the Tualatin district, a distance of 7.7 miles. An 8-inch main was laid from Tualatin to Wilsonville, situated on the Willamette River about 13 miles south of Portland. Crossing of the Willamette River, at this town, is made on the Oregon Electric Railway Bridge. This steel railway span, with 5 piers, is 800 feet long and 75 feet above low water. The 8-inch line continues southerly from this bridge to the town of Aurora on the Pacific Highway. The main line is laid on the Pacific Highway from Aurora to the present gas plant at Chemekata and Water Streets in Salem. The 8-inch line is 36.6 miles in length, making a total combined line of 44.3 miles. The route as planned passes throught territory not served by gas, and some districts not served by electricity.

SALEM CONSTRUCTION WORK

The present low pressure system (covering 35 per cent of the total area of Salem) reinforced by a 4-inch welded high pressure belt line around the extreme limits of the low pressure system, serves the business section and close-in residential districts. Some short low pressure main extentions have been made to reinforce the present low pressure system. The other 65 per cent will be supplied by means of 4-, 2- and 1-inch welded high pressure lines extending from the 8-inch main line and the 4-inch high pressure belt line. Customers services, ¾-inch and over, on high and low pressure mains, are being welded directly to the mains.

Small districts in the south and east portions of the city, now served inadequately by long runs of 2-inch low pressure mains, will be changed over to high pressure; new governors and meters being installed when the service is thus changed. District governors placed at advantageous points on the 4-inch high pressure belt line maintain constant and uniform pressure at the extreme ends of the low pressure main system.

The holder connections at the Salem plant were changed to allow filling the holder directly from the 8-inch high pressure line, when the Salem plant ceased operation. The present plant will be kept in reserve until such time as all operating details are worked out. The holder outlet has been enlarged to provide a greater flow into the low pressure system. The old outlet was badly corroded and stopped up with tar and other matter. The holder was calibrated and station meter corrected and placed in service in order to obtain the actual make and sendout each hour.

This company, soon after initiating its program in Salem, began changing all meters and connections, from customer record cards, to its standards; also servicing appliances, housepiping and giving instruction in the use of both new and old appliances. Service pipes that were found too small for the low pressure system were changed to larger welded service pipes. All of this work has caused very favorable comment and is certain to produce results that will exceed our expectations.

Most of the streets in Salem are 80 to 120 feet in width. On some streets, additional mains were laid in parking strips and the wide pavement not disturbed unless quite necessary. A boring machine, driven by air compressor, saved heavy pavement cutting and replacement; many bores of 60 to 70 feet being made. Concrete pavement is replaced by the company; the asphalt and bitulithic pavement, by the city, at the usual average costs.

Construction work by this company on the 4-inch high pressure belt line, 13,000 feet in length and oxy-acetylene welded, began on September 8. No digging machines were used on this work, due to many underground structures, pavement and well kept parking strips. Abandoned car tracks (now paved over) with their deep bases, caused considerable extra work on the 4-inch belt line construction.

The main 8-inch line was scheduled for completion on November 1, 1929, and construction work will continue on the high pressure laterals in Salem and other towns throughout the winter and spring of 1930. The character of the soil, drainage conditions, and the usual mild winters in Oregon will allow construction work to proceed without marked decrease in efficiency or increase in costs.

Present plans provide for the installation of all mains in Salem as fast as orders for service are secured by the salesmen. Smaller crews are working the districts between Salem and Portland and installation of mains and services will continue until every housewife in the territory to be served has been given an opportunity to use a modern fuel. All the buildings and homes in the towns and communities between Portland and Salem will be served by high pressure distribution mains with individual house regulators. Lateral high pressure mains will total over 50 miles in length.

MAIN LINE CONSTRUCTION

Plans for an 8-inch pressure line were completed in July, 1929. The proposed route was from Portland to Salem via Newberg, a distance of 49.5 miles. After due consideration, a revision was made in the route and new plans prepared. The route was shortened to 44.3 miles and for 7.7 miles of the distance the pipe size was increased from 8-inch O. D. to 10-inch O. D. This change effected a large saving, increased the capacity of the line, and provided for an extension of a 4-inch high pressure main westerly to Newberg in the near future.

The necessary county and city franchises and approval of plans were obtained from County officials. Permit to place the 8-inch gas main on the Pacific Highway was obtained from the Oregon State Highway Commission. On all county roads the pipe was laid 14 feet or more from the center line of the road but on the State Highway, we were

required, under terms of the State permit, to lay the pipe 23 feet or more from the center line and at a depth of 2 feet or more below the grade of the pavement. Due to presence, at 23 feet from the center line, of deep drainage ditches, parallel drain tile, power and telephone poles, the construction work along the highway proceeded under some difficulty.

Contract was awarded to The Steel Tank and Pipe Company of Oregon on August 26, 1929, to lay the 10-inch and 8-inch pipe as a complete line, pipe and fittings being furnished by the Portland Gas & Coke Company. The Steel Tank and Pipe Company sublet the digging and backfilling of the trench to the Parker-Schram Company, local general contractors, welding and pipe laying to be done by The Steel Tank and Pipe Company. Construction work was started on August 30, 1929, and was scheduled for completion on November 1, 1929.

Work was begun at the Salem end of the project, due to pipe shipments and to a desire to get all the work done on the State Highway before rains began in the late fall. One crew, with one excavating machine, began at the north city limits of Salem working toward the present plant, a distance of 2.5 miles; a larger crew, with two excavating machines and a caterpillar backfiller, began at the north city limits of Salem working toward Portland on the Pacific Highway, a distance of 41.8 miles. When the crew, working in Salem, had completed that 2.5 miles, they moved ahead of the crew on the route to Portland to speed up construction on the highway.

The 10-inch O. D. pipe has .175 wall and the 8-inch O. D. pipe .158 wall. It is plain end, beveled for welding. Lengths were specified from 16 feet to 24 feet, with 24-foot lengths in the majority. All joints are oxy-acetylene welded, with the exception of the valve connections, and other special connections. Dresser couplings, with lead-tipped rubber gaskets, are used at and near such connections, with flanges welded for valve connections. No coating of any kind was placed on either the 10-inch or 8-inch pipe. Pipe laid under electric railway tracks was placed in a wooden box filled with asphaltum, a piece of cast iron pipe at each end being bonded to the steel pipe to mitigate, as much as possible, electrolytic action. Pipe laid on bridges is painted to conform to the color or type of bridge.

The line of the trench was surveyed and grade stakes set ahead of the digging machines by field engineers of the gas company. Three trenchers were used. From 50 to 100 laborers were used for hand excavation in narrow places, in deep cuts or ravines, and for tunnelling under railroad tracks, roads and driveways. A tractor backfiller replaced the excavated material, with backfilling by hand where required.

The trench was being excavated to an average depth of 3 feet. On the Pacific Highway the top of the pipe had to be 2 feet or more below the grade of the pavement. In some locations, this requirement made necessary a trench 4 to 12 feet deep, due to the high bank at the side of the road which extends closer than 23 feet from the center line of the pavement. Steel and wood horses were placed on the ditch and leveled. Lengths of pipe were laid on these horses and spot welded to hold the pipe in place, the welding crew following up and welding each joint.

In testing the line this procedure was followed: Connections were made between the pipe and an air compressor and a section of the line, varying in length from one to three miles, pumped to 3 to 12 pounds pressure and all joints tested with soap suds. The pressure was then raised to 80 pounds with the pipe still on horses, and tested for 30 minutes. During this half-hour period, inspectors looked for split or otherwise defective pipe or joints. If the pressure remained constant the pipe was lowered into the ditch and covered except at the joints and special connections. It then underwent a 24-hour test at 80 pounds pressure. If the gauge showed no drop in pressure during this test the pipe was then completely covered, the ditch filled and rolled with a tractor wheel, more earth placed in the ditch and re-rolled and crowned.

Connections for lateral extensions, blow-offs, and drips were made by marking, cutting and welding a coupling of proper size directly to the top or bottom of the 8-inch or 10-inch pipe. Test risers are short pieces of ¾-inch pipe welded directly to the 8-inch and 10-inch pipe without the use of a coupling. These test risers are placed on each side of the main line valves and lateral valves 4-inch and over. Merco-Nordstrom 8-inch and 10-inch valves are used on the main line and smaller lines, with Mueller stop-cocks on lines 2-inch or less. Drips are of 50-gallon or more capacity, made of steel pipe with dished head. All work was under the close scrutiny of gas company inspectors and the contractor was paid on a footage basis only for the pipe tested, completely covered and having met all specifications. No classification of material was allowed, solid and loose rock, and earth being classed as "excavated material" only.

Pipe lines on bridges are being held in place by "U" bolts and saddles at each cross member.

The total cost of the Salem project is approximately $800,000.

AT RIGHT:

Night exterior view of Pacific Gas and Electric Company's newly opened exhibit of industrial appliances, in San Francisco, California.

AT LEFT:

Industrial apparatus at the P. G. and E. Beale Street display. Note enlarged photograph panels on wall.

Industrial Gas Display Opened *in* San Francisco

THE industrial gas display of the Pacific Gas and Electric Company has just been opened at 31 Beale Street, San Francisco, just around the corner from the company's main building at 245 Market Street. Gas equipment predominates in this interesting grouping of industrial appliances and appliances having to do with heat treating processes.

Water heaters, burners, furnaces, boilers and innumerable other gas burning appliances and devices are arranged on the floor in separate exhibits. The most outstanding and original feature of the whole exhibit comprises the greatly enlarged photographs mounted on panels and hung above every booth. These pictures strikingly depict the use of the various articles of equipment in industrial processes.

Ray Trowbridge, supervisor of gas sales for the San Francisco Division of the P. G. and E., is directly in charge of the exhibit.

On October 30, the day the hall was officially opened, a special luncheon meeting was held, presided over by P. M. Downing, vice-president and general manager of the company, at which 130 or more, all connected with the company, were present.. A. F. Hockenbeamer, president; W. S. Yard, vice-president in charge of gas construction; W. G. Vincent, vice-president and executive engineer, and R. E. Fisher, vice-president in charge of public relations and sales, all spoke briefly, devoting their remarks to the various phases of the problems encountered and surmounted in bringing natural gas into the San Francisco territory.

Form 1076 150M 9-29

PLEASE PRESENT THIS CARD WHEN PAYING BILL.

To COMMUNITY NATURAL GAS CO.

When Remitting by Mail Return This Stub Only.

METER READINGS		CHARGES		CHARGES	
PRESENT	PREVIOUS	GROSS	NET	GROSS	NET

M. Cu. Ft. Used

For Services Rendered to.....

Pay NET Bill On or Before.....
and Save Your Discount.

Failure to Receive Bill Does Not Entitle Consumer to Discount.

Consumers Accounting *and* Collections *for* Small Communities

(Continued from Page 38)

removal or discontinuance of service. In towns not large enough to justify an agent, an arrangement is usually made with a bank or drug store to act for the company for a nominal monthly fee. Gas applications, meter set and remove requests, etc., are relayed through the contact medium above referred to, to the "group" or "district" office, where gas applications are filed, meter orders issued, security deposit receipts forwarded (on receipt of money), etc. The bank, drug store, or agent, as the case may be, also serves as the collector, receiving and reporting to the "group" or "district" office the amount and from whom moneys were collected at the end of each day.

The question naturally occurs to the reader here as to what means is provided the collector to know what is due and for whose account money is tendered. This brings us to the efficacy of the machined records, and may be dealt with very briefly owing to the simplicity of the procedure.

Customers are billed from meter reading slips sent in from district offices (meter reading to be done under district superintendence), such bill being made on a regular Government 1c postal card and mailed direct to the customer. Under this card, in the machine, are two sheets showing folio and name of customer, these having been prepared in advance from addressograph plates, which have been made in the usual manner.

By this means, it is seen that there are two records, or copies, of what is known as the Sales Audit Sheet. One copy of this is retained in the central office and from it postings are made to the General Ledger Control over consumers' accounts receivable, and sales statistics are prepared in summary form to support credit to sales. The Sales Audit Sheet total for each town is posted to a subsidiary ledger under the name of the town affected.

The remaining copy of the Sales Audit Sheet is forwarded to the district office and filed in binders provided for the purpose, atop the last month's copy.

When billing towns too small for an office a duplicate bill is made by the machine. These duplicate bills are sent direct to the collector for his record and to be used as duplicate bills in case the consumer has lost the original.

Collections made by banks, drug stores or agents in towns where no office is maintained are deposited by these collectors in a bank designated in the town where collections are made. The collector simply lists the collections on a daily collection report which is sent with bill stubs and a duplicate deposit slip for the total of such stubs to the district office, where postings, by means of a dater stamp, are made to the district office copy of the Sales Audit Sheet.

All collections of a district office (including both those made by outside collectors and direct remittances) are reported to the central office by means of a Daily Cash Report which segregates collections by towns and by banks. This report serves to satisfy the bank control records of the treasury office, as well as to credit the consumers' accounts receivable control ledger kept by towns, and in turn to post the general cash book from which the general ledger control is effected.

We have now arrived at the point which is probably the most important function and most difficult, under the handwritten billing system, to control, i. e., the balancing of delinquent accounts against the controls for the various towns. This is done by simply taking off, six days after the discount expiration date, a list of the open items on the district office copy of the Sales Audit Sheet, deducting any advance payments (which, by the way, are kept track of by making a dummy sheet filed with the Sales Audit Sheets) and sending same to the central office for comparison. This delinquent and advance payment list is also accompanied by a summary of:

1. Last month's balance uncollected.
2. Plus this month's charges.
3. Less cash collected during the period.
4. Balance last of month.

This report shows the beginning and ending cash report numbers, so that the town control ledger, whose credits are identified by cash report numbers, can be easily reconciled with the balance shown by the above mentioned report.

Naturally, the organization and policies of management with different territorial conditions would affect the detailed operation of such a system, but in the main the principles of accounting embodied in the Sales Audit Sheet plan are applicable to any utility, engaged in any phase, whether operating in towns of 500 or 500,000; but the highest efficiency is to be expected when 20,000 or more consumers can be handled in a central billing department, since the limit of consumers that can be handled in such a department has not, so far as we know, been reached.

F. A. HOUGH SPEAKS AT MEETING OF SANTA MARIA GAS CO.

F. A. HOUGH, research engineer of the Southern Counties Gas Company, addressed 35 members of the operating staff of the Santa Maria Gas Company at the regular monthly meeting of that organization on Tuesday evening, Nov. 26, at Santa Maria, Calif.

F. A. Hough

The subject of the address was under three heads: 1. Odorization of natural gas. 2. Uses for liquefied petroleum gas, with special reference to plant to be installed at Moor Park. 3. General discussion of the Southern Counties Gas Company's transmission system and holder stations. A discussion of the three topics followed, including the answering of questions by the speaker.

OHIO OIL COMPANY ASKS FOR POCATELLO FRANCHISE

The Ohio Oil Company, through L. B. Denning and John McFayden, has applied for a franchise for the service of natural gas in Pocatello and other communities in southwest Idaho. The supply of fuel would come from the Wyoming fields through the company's pipeline to Salt Lake and other centers in Utah. This line, if the franchises are granted, will be extended to the Idaho cities. Towns named in the action are Franklin, Oneida, Bannock, Preston, Malad, Downey, McCammon and Pocatello.

GRANDVIEW FIRST WASHINGTON CITY TO GET NATURAL SERVICE

The first natural gas line in the State of Washington was placed in service early in November when the city of Grandview, Washington, was connected to the Northwestern Natural Gas Company's 25-mile pipe line from the Benton County fields. Prosser, Sunnyside, Mabton, Kennewick and Pasco, are all on the same line.

NEW MEXICO TOWNS TO ACT JOINTLY ON FRANCHISES

Santa Fe, Albuquerque and Las Vegas, New Mexico, will hold a joint conference on the subject of natural gas franchises on December 23, at Albuquerque. Officials of the three cities will meet at that time to decide which company will serve the three cities. Nearly 10 franchise petitions already have been filed in the towns.

K. N. CUNDALL WITH STANDARD NATURAL GAS DEPARTMENT

K. N. Cundall

K. N. Cundall has accepted a position as chemical engineer in the contemplated Natural Gas Department of the Standard Oil Company at the Richmond, California, refinery of the company. Mr. Cundall was formerly assistant chemist of the Pacific Gas and Electric Company, being in the employ of the utility for the past six years. He assumes his duties with the Standard Oil Company on December 1.

'UTILITY MERCHANDISING' OFFERED TO GAS COMPANY EXECUTIVES

THE Automatic Washer Company of Newton, Iowa, has published an attractive booklet entitled "Utility Merchandising," in which a number of chapters are contributed by utility executives. Colonel George Washington Hill, director of public relations for the Automatic Washer Company, had charge of the publication, which he is sending on request to presidents, vice-presidents, general managers, commercial managers and merchandise managers of utilities.

Following is a list of papers and addresses given in the new publication:

"Why A Central Station Should Merchandise," by Paul Renshaw.

"Public Relations," by William S. Vivian.

"1929 Address at Middle West Division N. E. L. A. Convention," by J. F. Owens.

"1927 Address at Rocky Mountain Division N. E. L. A. Convention," by John W. Devereaux.

"Employment of Resalesmen," by Colonel George W. Hill.

"Selling Goods Through Window Displays," by Courtesy of Merchants Service Bureau, National Cash Register Company.

"Merchandising by Gas Utilities," by J. J. Burns.

"Is the Utility More Dependent Upon the Community than the Community Upon the Utility," by Colonel George W. Hill.

"Are We High-Hatting the Homes of Necessity?" by Colonel George W. Hill.

"Useful Merchandising Tables and Suggestions," by Merchants Service Bureau, National Cash Register Co.

"Advertising—The Backbone of the Campaign," by Frank B. Lower.

"Utility Merchandising," by Colonel George W. Hill.

INDUSTRIAL INSTALLATIONS ADD TO DENVER'S NATURAL LOAD

Two industrial natural gas heating installations have been made in Denver by the Public Service Company of Colorado. It is estimated that, in the aggregate, these conversions will consume about 24,000,000 cubic feet per year. The "Denver Post" office and newspaper building will use approximately 18,000,000 cubic feet of natural gas, and the three-story warehouse of E. A. Stephens & Company will use about 6,000,000 cubic feet. The Denver booking office of Warner Brothers, Inc., is also using natural for fuel.

Over 10,000 Meters Added *to* Houston Natural Lines

MORE than 10,000 new domestic and industrial consumers of natural gas were added to the lines of the Houston Natural Gas Company and its three associated companies in the Buckner group during the five-month period ending November 9. This record of expansion is shown by a report just released by General Manager W. B. Trammell.

These companies are now rendering service to more than 17,500 accounts.

This period of rapid growth started with the summer months of this year. Meter readings for June were 1,393, while the July total jumped to 1,699. The last three months, however, have shown an even heavier rate of growth.

For this period of August 3 to November 9, the Houston Natural Gas Company had a record of 5,236 meters. This company distributes throughout Houston and suburban territory.

In the same period the Gulf Cities Natural Gas Company accounted for a net gain of 848 meters. This company distributes in Goose Creek, Baytown, Pelly, Freeport, Texas City, La Porte, Alta Loma, LaMarque, Algoa and Bayshore additions.

The three-month record of Texas Natural Gas Utilities was an increase of 1,595 meters. It operates in Victoria, Wharton, Beeville, Newgulf, El Campo, Goliad, Edna, Richmond, Alvin, Bay City, Boling, Beasley, Hungerford, Missouri City, Stafford, Ganado, Inez, Iago, Teflerner, Pearland, Hobby, Woodsboro, Matagorda and other towns.

The Tex-Mex Natural Gas Company, operating distribution systems at Alice, Agua Dulce and San Diego, also reported a substantial gain.

In addition to the present service, several extensions are being made by these companies. The Gulf Cities Natural Gas Company has laid a line through Bayshore territory between La Porte and the Houston Yacht Club. It crosses more than half a dozen of the residential additions in that territory and makes natural gas fuel available to a two and one-half mile strip of new territory. The Texas Natural Gas Utilities also is starting work on a system to extend service in Angleton and Danbury, in Brazoria county, where between 100 and 200 families will be served from the outset.

TIME-O-STAT CONTROLS CO. ANNOUNCES NEW GAS VALVE

TIME-O-STAT Controls Company of Elkhart, Indiana, has developed a new type electric gas valve. According to Time-O-Stat engineers it makes possible silent control of all low pressure gas-fired equipment, when used in conjunction with a room thermostat.

New features of the valve are: Moving parts have been reduced to a minimum, no gears or levers are employed and no intermediate relay is used, and it is smaller than previous models.

A "gas-tight" case encloses the valve, lessening the possibility of gas leak. All electrical controls are on the outside of this case. Contacts are protected by an outer case, finished in black enamel.

BILLINGS GAS CO. TO BUILD REGULATOR STATION

According to an announcement made by J. E. Moore, manager of the Billings Gas Company of Billings, Montana, the company will soon begin work on a new meter and regulator station at Dry Creek. The work will be in charge of the Gallatin Natural Gas Company. It is planned to construct an underground steam plant some distance from the regulator.

R. G. BARNETT ACCEPTS POST IN RIO DE JANEIRO

R. G., "Jerry," Barnett of the Coast Counties Gas and Electric Company is leaving the first of December for Brazil, where he will have an important executive position with the Emprezas Electricas Brasileiras, which is controlled by the Electric Bond and Share Corporation, and he will make his home in Rio de Janeiro. Mrs. Barnett and two small daughters will accompany him.

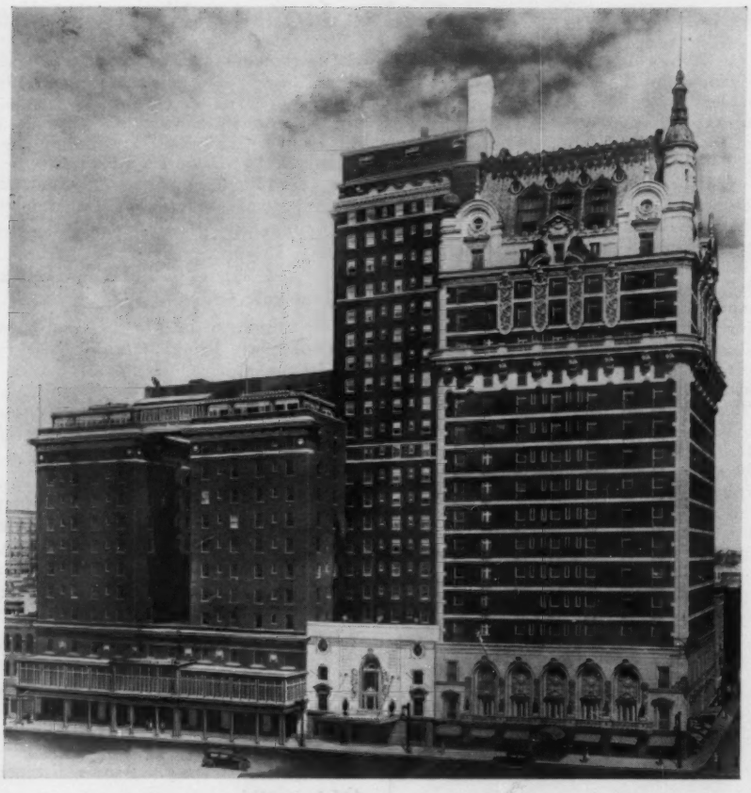
Mr. Barnett has been connected with the Coast Counties Gas and Electric Company for the past several years, first as district manager at Gilroy and later as manager of public relations for the entire company with headquarters at Santa Cruz, California. Previous to that time he was with the Pacific Gas and Electric Company.

Mr. Barnett has played an important part in the Pacific Coast Gas Association, being general chairman of the entertainment committee at the last convention at Del Monte, and acting on several committees in the Public Relations and Advertising Divisions of that organization.

About 35 of Mr. Barnett's many friends from San Francisco and vicinity gathered with him for a farewell dinner just prior to his departure. Jim Pollard presided as toastmaster and the affair was under the guidance of Harry Eckenroth.

President Wilson of the Coast Counties Gas & Electric Company was generous in his praise of a friend and employee, and the many speakers called upon wished Mr. Barnett good luck in his new position. A wrist watch and a hand illuminated presentation parchment, bearing the signatures of all present, were the parting gifts from his friends in the gas and electric industries.

Sailing from New York on the Southern Cross, December 14, Mr. and Mrs. Barnett and family will cross the equator on Christmas day.



Adolphus Hotel, Dallas, Texas

Dallas Hotels *are* Major Gas Users

By PAUL EGAN

THE hotel load in Dallas, Texas, represents one of the substantial groups of domestic and industrial users of gas in this city. There are approximately 100 hotels in Dallas and practically all of them use gas for every available application.

The Adolphus Hotel, second largest in the Southwest, being one of the most extensive purchasers, offers an interesting example of the uses to which gas is put. This hotel has two large basements, embracing 50,000 square feet, filled almost to overflowing, with equipment utilizing gas either directly or indirectly.

Three 500 h.p. Hiene water tube safety boilers together with gas burning equipment in five kitchens constitute the major uses for gas by the hostelry. The boilers alone consume upwards of 26,000,000 cubic feet of gas per average month.

Steam from the boilers operates five generators which furnish light and power to the Adolphus and to a nearby office building. Both the Adolphus and the office building are heated by the exhaust steam, which also heats all hot water.

The hotel operates four ice machines, which supply iced air for the luncheon room and barber shop, as well as furnishing refrigeration for all ice boxes in the five kitchens. Five and a half tons of ice per day are made by the refrigeration plant. This plant is also operated by steam from the boilers.

Steam is also furnished for the hotel laundry and for two air compressors which pump water for the hotel and the adjacent building from three deep wells. The air compressors force the water into elevated tanks from which the rooms are supplied.

The five kitchens, while presenting a major gas load, do not compare in size to the boiler application. Four dish washers, three glass washers, gas toasters, gas boilers, gas cookers, bake ovens, and other pieces of equipment, however, in addition to the gas ranges bring the total gas load in the kitchen to a high figure. A complete bakery and ice cream manufacturing plant are also maintained by the hotel.

In the summer time, instead of the gas load decreasing, it increases in size, due to the fact that more steam is required to operate the generators which provide electricity for the electric fans. Each of the 825 hotel rooms is equipped with a large ceiling fan.

Other things having a direct bearing on the gas load are the laundry, using hot water and electricity, 15 elevators, a tailor shop and three printing presses. These latter operate electrically, and are used to print menus, hotel notices, pamphlets, etc.

CONSUMERS GAS CO. TO SERVE COUTTS AND SWEET GRASS

Coutts and Sweet Grass, Mont., are in line for natural gas service from wells in the Red Coulee field on the Montana-Alberta border. The line is now being built by the Consumers Gas Company, of which E. B. Coolidge of Great Falls is vice-president.

PACIFIC GAS AND ELECTRIC CO. BUYS MODESTO GAS CO.

Confirmation of the report that the Pacific Gas and Electric Company has purchased control of the Modesto Gas Company has been verified by A. F. Hockenbeamer, president of the P. G. and E.

Although no announcement of the purchase price was made, it is understood that 70 per cent of the Modesto Gas Company stock was purchased on the basis of an exchange of stock, the transaction being subject to the approval of the state railway commission.

The P. G. and E. will be serving Modesto with natural gas in a short time.

PRAIRIE OIL & GAS COMPANY DECLARES STOCK DIVIDEND

At a meeting held November 15, directors of the Prairie Oil & Gas Company declared the regular stock dividend of 50 cents a share for the fourth quarter of the year and an extra dividend of 25 cents a share. Payment will be made on December 31 to stock on record on November 30. This brings the total dividends to $3.00 for the year.

Directors of the Prairie Pipe Line Company, at a session held November 16, declared a regular dividend of 75 cents a share and an extra dividend of 50 cents a share, which will be paid on the same basis as the dividends of the oil and gas company.

SAN DIEGO CONSOLIDATED HAS NEW BOOKKEEPING SYSTEM

San Diego Consolidated Gas and Electric Company has introduced a new system into its bookkeeping department. Prior to August each bookkeeper did work of a general nature, such as posting cash, entering meter readings, balancing ledgers. With the new system, each worker in the department will be confined to one type of work. It is hoped by the company that this specialization will produce a higher degree of efficiency than was possible under the old regime.

SOUTHWEST DISTRIBUTING CO. SERVES EIGHT NEW TOWNS

The Southwest Distributing Company, a subsidiary of the United Gas Company, has turned gas into eight new towns in Southeastern Texas, near San Antonio, within the past 45 days.

Floresville in Wilson County received gas recently, as well as the towns of Poth, Falls City, Karnes City, Kenedy, Runge, Nordheim and Yorktown, in the same locality.

BILLINGS GAS CO. SPENDS LARGE SUM ON IMPROVEMENTS

The Billings Gas Company of Billings, Montana, subsidiary of the Midland Empire Company, has expended $160,000 in its program of preparation for winter needs in Billings and other towns served by the Midland Empire Company. Larger mains, feeder extensions on city lines, new regulator stations and additional pipe lines constituted some of the items included in the expenditure.

HAVRE NATURAL GAS CO. IN NEW ALL-GAS BUILDING

The Havre Natural Gas Company, of Havre, Montana, moved into new quarters in the Clinic Building late in October. All of the building, which houses a furniture company and the clinic, will be heated with natural gas. Frank McCarthy is manager of the company, which is a subsidiary of the Montana-Dakota Gas Company.

Advances *in* Production *of* Oil Gas

(1) Oil gas production.
(2) Physical separation of lampblack.
(3) Formation of producer gas.
(4) Production of water gas.

Oil Gas Production:

It might seem with our many years of experience, oil gas production would not come in for any serious study in connection with this development work, but from the very first it has been recognized that the way in which the oil gas was produced had a very definite bearing on the other three major problems, and, while we have departed to some extent from what may be considered as standard oil gas practice, our principal endeavor has been to duplicate standard oil gas conditions in order that the physical condition of the by-product, lampblack, both for separation and subsequent use, would be comparable with present practice. It is certain, however, that the subject of the initial cracking of the oil offers a fruitful field for further study.

Separation of Lampblack:

The physical separation of oil gas lampblack in the filter-producers for subsequent use, presented the major problem, on which there was the least available data and no precedent from any other operations. That oil gas could be passed through a bed of previously deposited lampblack and completely separated from residual carbon was simply and speedily demonstrated, and the problem of separation then resolved itself into:

(a) Maintaining the proper permeability of the fuel bed;
(b) Maintaining thermal equilibrium.

The deposition of lampblack on the surface of a fuel bed would seem to create an impermeable mat or layer difficult of subsequent use and precluding the possibility of further filtration. The cooking of this material, however, by the passage of hot gas there through recovers the volatile matter and leaves the lampblack deposited as a coke. This coke, while of coarse structure and little strength, is porous and granular and the mat formed by the separation of any one run of oil gas is quite easily shattered into innumerable fine and reasonably uniform particles.

The proper grate or support for the fuel bed is undoubtedly the most important element in maintaining uniform permeability and satisfactory filtering. Plate 2 shows six steps or stages in the evolution of the final type of grate which is now in use and successfully accomplishes the desired result. Based on our preliminary work with the water gas unit, the demonstrating unit was started with Eureka bars. This is an agle-of-repose type of grate with about 25 per cent free opening divided into many horizontally opposed nostrils, or channels. The Eureka bar divides and distributes the air uniformly over the entire grate area and maintains a uniformly satisfactory fuel bed condition, but after an indefinite period which could be materially lengthened by proper care, ultimately became plugged up and necessitated removal and cleaning. No means to keep these bars free and clear for more than three to four weeks were effective, and finally the Eureka grate was abandoned entirely as unreliable.

In place of the Eureka bars, a bed of refractory spheres was substituted and with

(*Continued from Page 42*)

various modifications this principle has been developed and perfected. A graded bed of refractory spheres starting with two inches in the lower layer graduated to 1½ inches, and finally 1 inch on top, to a total depth of 18 inches, was first used. This was supported on an open grid as indicated in Plate II-B. This type of grate proved entirely reliable, overcoming the objections to the Eureka bars but introducing new problems which had to be overcome. In a bed of spheres with approximately 23 per cent voids, the blast has a tendency to pass horizontally as well as vertically through the grate and concentrate the activity in the center of the producer. On the first ball grate, as shown in Plate II-B, approximately 80 per cent of the center of the grate was later blanked with a solid plate but failed to overcome the tendency to center activity and later gave way to what we have termed the "hat" grate, shown in Plate II-C. This was an annular grid introducing the blast horizontally and directed toward the walls at the base of the refractory spheres, but, while an improvement, finally gave way to the modified "hat," Plate II-D, of much lower and more restricted air space directed closer to the walls.

To this was later added a conical section to entirely blind the center of the grate and compel the passage of air in more nearly vertical lines. This to a great extent equalized the activity over the grate area, but temperature traverses made with long thermo-couples at various depths in the ball grate indicated that with practically all of these designs the air passed horizontally to the center of the fuel in the lower section of grate and created intensive activity in the center of the fuel bed. This permitted an accumulation of lampblack around the side walls on the top of the grate, preventing the proper coking and necessitating periodic levelling. Water cooled rakes, similar to those in standard producer gas practice, were used for this purpose, but early in the experiments it was realized any agitation or disturbances which might be necessary or desirable to maintain uniform permeability, should come from beneath and not from on top of the fuel bed.

Plate II-E shows the first step along these lines and indicates a sectional grate consisting of 10-36° cast iron sectors, each hinged at the wall and terminating in a movable support at the center. The rod supporting the center of these grate sections passed through the bottom of the producer to a hydraulic cylinder, permitting the center to be raised or lowered from the horizontal position and thus maintain agitation or movement of the grate. Air was introduced through capstan shaped tuyeres in the center of each section, distributing the air uniformly over the area in horizontal streams. This design was quite successful and a distinct improvement over previous designs, and worked satisfactorily. The principal criticism of this type was the maximum agitation in the center with a minimum agitation at the walls, with the added objection of too much personal equation through periodic operation.

With two filter-producers performing identical functions, changes in design have been confined to one at a time for comparative purposes.

At the same time the sectional grate was in use in the south producer, the first conical grate shown in Plate II-F was installed in the north producer. This grate consisted of a fixed section in the shape of an inverted frustrum of a cone, occupying approximately half the diameter, or three-fourths of the grate area. The center was a movable conical section. This grate was quite satisfactory and imparted periodic movements uniformly to the entire mass of spheres and was the forerunner for the present type of grate shown on Plate III.

The present improved grate, while similar in design, is of an entirely different principle in that while the vertical movement is still maintained for periodic use if necessary, the very minute agitation necessary is maintained with continuous slow rotation of the center section. This imparts a very slight rolling motion to the spheres in immediate contact with the center section which in turn is imparted to adjacent spheres. To increase this activity the rotating section is not truly conical, but is flattened on two sides to impart a distinct wave motion and side movement of the spheres each 180°. In this grate the air is admitted through out 42 oval openings in the fixed section with corresponding nozzles in the steam header utilizing static pressure of the steam used for producer gas and water gas to prevent deposition or accumulation in the openings.

Through the development of this grate it is possible to maintain uniform permeability, with consistently satisfactory filtering and uniform and even production of producer gas and water gas. With the development of the conical grate the use of graded spheres was abandoned and refractory spheres 2½ inches in diameter are now being used.

It is not unlikely that this grate, developed to satisfactorily handle the unique deposited and coked fuel from oil gas operation, will find a still wider field of usefulness in handing breeze and fine coke in connection with other operations.

Maintaining thermal equilibrium in the fuel bed cannot in reality be considered apart from the physical problem of maintaining uniform permeability, as the producer gas reactions can be adjusted to exactly balance the water gas reactions as regards liberation and absorption of heat, if the air and steam are brought into intimate contact with all of the deposited fuel.

There is no doubt that the desirable filtering should be a purely physical function and that the temperature of the fuel bed should be sufficiently low as to preclude secondary reactions or further cracking of the oil gas in its passage therethrough.

Paradoxical as it may seem, the best operation is maintained with comparatively small filter-producers and with the high velocities thus employed, physical separation can be accomplished with the deposited fuel still quite hot and in a condition to instantly react with air and steam to form producer gas.

With the fuel still below the critical temperature of oil gas, there is no deposition or separation of tar within the filter-producers and the complete separation and subsequent use of lampblack would still leave a tar by-product in a quantity approximating ordinary oil gas practice, but of a quality more nearly resembling water gas tar. To accomplish the complete elimination

of by-product, the tar produced is reintroduced into the apparatus as a spray during the filtering operation. The high volatile matter of this tar acts to consolidate the lampblack particles and stimulate the coking action, and accomplishes a complete clean-up process.

Formation of Producer Gas:

As in standard water gas practice the formation of producer gas to re-heat the checker brick is secondary in importance to re-conditioning the fuel for water gas production. Because of the extremely fine particles forming the carbonaceous aggregate with which we have to deal in this process, and the enormous surface of incandescent carbon presented for reaction, no difficulty has been experienced in making producer gas of a wide range of thermal value. It will be apparent the cycle which best performs the desirable re-conditioning of the fuel bed for water gas reaction results in a lean producer gas of relatively low thermal value, and as this producer gas is introduced into the make chamber of the oil gas portion of the apparatus at the completion of the gas making cycle, considerable difficulty was experienced in the experimental set as originally designed in initiating and supporting combustion in the open chamber. The re-introduction of tar to a considerable extent alleviated this condition by contributing an appreciable amount of hydrocarbons to the lean producer gas during the early part of the blow. The addition of superheater chambers in the apparatus, as indicated on Plate I-B, and through which additions the secondary air was preheated, insured a temperature within the make chamber sufficient to ignite and maintain combustion of a lean producer gas.

The following analysis of producer gas indicates the wide range over which satisfactory operation has been maintained:

CO_2	15.4	9.0
Unsaturated hydro-carbons	.4	2.2
Oxygen	.4	.4
CO	5.4	5.4
CH_4	1.6	10.4
H_2	6.4	17.2
N_2	70.4	55.4
B.t.u.	65	237

Production of Water Gas:

The simple reaction by which steam dissociates and recombines to form water gas in the presence of incandescent carbon presents little difficulty other than the maintenance of uniform permeability in the fuel bed, but in connection with the new process the formation of water gas, either as to amount or quality, is secondary to the reduction of the temperature of the fuel bed to permit its use as an inert filter on the subsequent run. To maintain the proper thermal equilibrium and the desired depth of fuel, the quality of water gas frequently varies within rather wide limits of which the following are typical:

CO_2	10.2	9.4
Unsaturated hydro-carbons	.6	.2
Oxygen	.4	.2
CO	21.2	31.7
CH_4	2.1	2.2
H_2	49.6	52.1
N_2	15.9	4.2
B.t.u.	265	300

Either of the above gases would be subject to criticism in standard water gas practice, but in connection with an oil gas process it should be born in mind that this blue water gas is the atmosphere in which the fuel oil is cracked and not only contributes a catalyzing effect but participates and is further reacted on in the presence of incandescent carbon.

While such residual as it is impossible to combine with dissociated steam in the actual oil-gas reactions is retained on a filter bed and subsequently blasted to incandescence and subjected to direct contact with steam, there is no intent in connection with this new process to prevent the formation of water gas within the checker work. Where much improvement was made in previous development work by the introduction of highly super-heated steam, in which atmosphere partial decomposition of the oil took place, the new process goes a step farther and the oil is cracked in an atmosphere of blue water gas which contains some carbon dioxide and an excess of steam, all highly superheated. The analyses of water gas were taken at the tops of the filter-producers and before the gas had passed through the checker work and been subject to further reaction and combination.

In all intelligent development work an indispensable element is some definite objective or possible attainment. The gross or over-all efficiencies of most oil gas processes have been very much alike, the principal differences in the several types of apparatus in common use being in the relative percentage of gas and residual recovered from a given quantity of oil. Radiation and sensible heat losses are very much the same, and if we then retain within an apparatus all lampblack formerly produced as a by-product and recover and reintroduce such tar as is produced, the efficiency of the apparatus as a gas making process is 100 per cent less radiation losses, stack losses and the sensible heat of the finished gas dissipated in the wash box.

Prior to 1922 when a topped crude oil was available for gas making on the Pacific Coast, the larger gas operations using modern equipment were able to produce 1000 cubic feet of 550 B.t.u. gas with the use of seven gallons of oil, of which .85 of a gallon represented heat oil, or the means of maintaining the operation, and 6.15 gallons represented the make oil or actual input. In addition there was recovered 14 pounds of lampblack and 3 pounds of tar, or a total recovery of 17 pounds of hydro-carbon residual. This may be more clearly expressed as follows:

Oil + Steam = Gas + Residual or

$$\left.\begin{array}{l}\text{.85 gallon Heat Oil}\\ \text{6.15 gallon Make Oil}\\ \hline \text{7.00 gallon Total Oil}\end{array}\right\} + 5 \text{ lbs. Steam} =$$

$$\text{1000 c.ft} + \left\{\begin{array}{l}\text{14 lbs. Lampblack}\\ \text{3 lbs. Tar}\\ \hline \text{17 lbs. Total Res.}\end{array}\right. \text{ or}$$

$$\left.\begin{array}{l}\text{123,250 B.t.u.}\\ \text{891,750 B.t.u.}\\ \hline \text{1,015,000 B.t.u.}\end{array}\right\} + 5800 \text{ B.t.u.} =$$

$$\text{550,000 B.t.u.} + \left\{\begin{array}{l}\text{203,000 B.t.u.}\\ \text{45,000 B.t.u.}\\ \hline \text{248,000 B.t.u.}\end{array}\right.$$

and from which it is evident that the gross or overall efficiency of the process was $\frac{798{,}000}{1{,}020{,}800}$ or 77.5 per cent and the net efficiency or relationship between the input of oil for all purposes and gas recovery was $\frac{550{,}000}{1{,}020{,}800}$ or 54.1 per cent.

With the advent of modern oil cracking processes, fuel oil for gas making purposes has undergone a marked change. Cracking and re-cracking for gasoline recovery, dictated by the relative crude production and gasoline demand, has resulted in a fuel oil which is a conglomerate of residuals from many operations, of oils of widely different boiling points and through the use of which product oil gas efficiencies have materially suffered.

Results being obtained today with fuel oil may be expressed as follows:

$$\left.\begin{array}{l}\text{.95 gallon Heat oil}\\ \text{6.55 gallon Make oil}\\ \hline \text{7.50 gallon Total oil}\end{array}\right\} + 5 \text{lbs. Steam} =$$

$$\text{1000 cu. ft. Gas} + \left\{\begin{array}{l}\text{17 lbs. Lampblack}\\ \text{3 lbs. Tar}\\ \hline \text{20 lbs. Residual}\end{array}\right. \text{ or}$$

$$\left.\begin{array}{l}\text{138,000 B.t.u.}\\ \text{950,000 B.t.u.}\\ \hline \text{1,088,000 B.t.u.}\end{array}\right\} + 5800 \text{ lbs. Steam} =$$

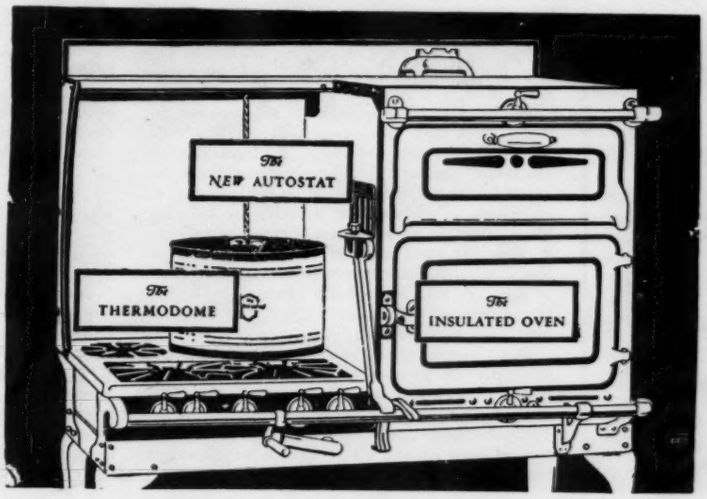
$$\text{550,000 B.t.u.} + \left\{\begin{array}{l}\text{246,000 B.t.u.}\\ \text{45,000 B.t.u.}\\ \hline \text{291,000 B.t.u.}\end{array}\right.$$

from which it is evident that the present gross efficiency is $\frac{841{,}000}{1{,}093{,}800}$ or 77.2 per cent and the net efficiency is $\frac{550{,}000}{1{,}093{,}800}$ or 50.2 per cent.

The net gas efficiency or relationship between make oil and gas recovery has decreased from 89,500 B.t.u. per gallon to 73,500 B.t.u. per gallon. It is apparent that the decrease in efficiency through the use of fuel oil available today for gas making purposes, as compared with the topped crude available a few years ago, is not in the over-all efficiency of the apparatus, but in the net gas efficiency, and if the increased amount of residuals is all retained within, or reintroduced into, the apparatus for gas making purposes, this loss in efficiency through a change in raw material, a condition over which the gas companies have little or no control, is entirely eliminated.

In the last few years flush production in what now seems to be the inexhaustible oil deposits in this country, has to some extent recreated the conditions prior to 1922, and fuel oil has consisted in a greater part of topped crude, through which gas companies have obtained a better grade of fuel oil for gas making and there has been a relatively small differential between the price of gas oil and fuel oil.

The country seems at last, however, to be awakening to a conservation consciousness and the deliberate waste and dissipation of this enormous natural resource will most certainly be stopped. The Lyon Act in California is merely the beginning of national conservation and it is probable that in the near future the refiners will be compelled



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Furthermore, we have developed a method of selling that fully meets competition and are prepared to promptly co-operate with your sales organizaation in doing a real job.

We suggest that the Chambers proposition be given serious consideration in arranging your 1930 program.

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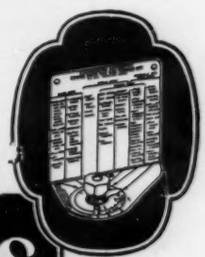

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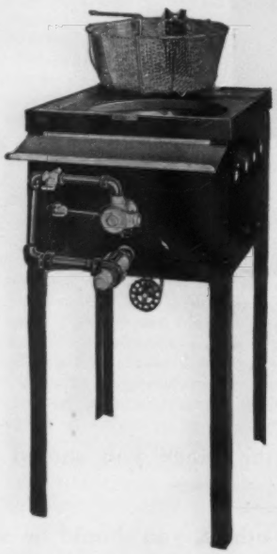

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to resort to further recracking for the production of gasoline, with the inevitable result that gas oil will become the refiners' principle raw material for gasoline production, rather than a gas making material, and that fuel oil available for oil gas manufacture will be even more difficult to handle.

As long as oil is produced and refined for motor fuel and lubricants there will always be more or less residual fuel oil as an economic necessity. This residue must inevitably be a hydro-carbon in some form, all of which is convertible directly or by combination with steam, into a commercial gas. It requires then only a process which combines the various steps or stages necessary to convert this material to gas to make any liquid hydro-carbon economically a satisfactory raw material.

If we assume that gas generating apparatus as at present in use has attained an economic balance between heat losses and the fixed charges incurred by increased insulation, or recuperation, but that the remaining potential heat of the oil is usable or recoverable as gas, we have the following equation:

Make Oil Only + Steam = Oil Gas + Deposited Carbon
and Deposited Carbon + Steam and Air = Producer Gas
and Deposited Carbon + Steam = Blue Water Gas.
Therefore:

6.55 gallon Oil + Steam = { 1000 cp. ft. 500 B.t.u. Oil Gas; 510 cu. ft. 300 B.t.u. Water Gas; 1100 cu. ft. 125 B.t.u. Producer Gas } or

4.3 gal. Oil + Producer Gas from excess carbon=1000 cu. ft. 466 B.t.u. Gas.

The theoretic efficiency then of a process for complete gasification of oil is approximately 108,000 B.t.u. per gallon. In actual practice, however, much less producer gas is required to maintain checker temperatures than the present ratio of heat oil to make oil, principally due to the almost negligible amount of excess air required to maintain perfect combustion and heat distribution. Practice has also developed that the actual thermal value of gas produced approximates 500 B.t.u. and the maximum operating efficiency probably 100,000 B.t.u. per gallon.

While the advent of natural gas in many localities has for the moment deferred consideration of the increased efficiency of production and utilization of lower thermal value gases, it is certain that the great bulk of domestic and industrial gas which will be manufactured from basic fuels, will in the future be of lower rather than higher calorific value.

The foregoing equations have indicated what is obtainable and in which prediction the only assumptions which have been made are that:

(1) Oil gas and lampblack can be made, as has been the common practice on the Pacific Coast and elsewhere for many years.

(2) That lampblack can be retained within the apparatus and tar reintroduced for subsequent use to produce:

(a) Producer gas to take the place of heat oil.

(b) Water gas to consume the remaining excess carbon,

all of which has been completely and thoroughly demonstrated separately by many years of operation, and in combination in the new process by more than a year's operation of the demonstrating unit.

While for many years the production costs of oil gas have been favorably comparable with other methods of manufacture the handling of by-products has condemned the process in the eyes of gas men generally, and this condition has been tolerated from custom. While the economics of this development are of great importance, the aesthetic improvement is not to be over looked and oil gas will now undoubtedly go far in its logical field of usefulness.

With the demonstrating unit results have been obtained in daily, weekly and monthly operation, which have shown that it is entirely practicable on even small units to produce 1000 feet of 500 B.t.u. gas on 6 gallons of fuel oil or less; and, when due credit is taken for the size and conditions of these operations, it may conservatively be stated that oil gas can today be made without by-product and with the use of not to exceed 5½ gallons of any grade of residual fuel oil.

Add to this the maximum of flexibility, the minimum of labor, and an investment charge as low, if now lower, than any type of gas making apparatus developed to date; a specific gravity and freedom from inerts comparable with and practically duplicating the best coal gas production; and we have an element which must inevitably take an important place in the gas industry.

It is with a pardonable feeling of pride that I record the culmination of many years of intensive effort devoted to the improvement of oil gas, with which feeling is inseparably linked a grateful appreciation of the splendid cooperation which has been afforded by the San Diego Consolidated Gas and Electric Company and its personnel. The sterling character of the men of this organization, ever alert in the interests of their public service, and their unselfish devotion to the interests of the industry, has been an inspiration without which this development would have been impossible.

THE STEAM AND COMBUSTION CO. ENTERS GAS-BOILER FIELD

The Steam and Combustion Company, 205 West Wacker Drive, Chicago, has been incorporated for the production and sale of gas fired boilers and kindred lines. The company is owned and operated by the G. W. Dulany Trust, Chicago. G. W. Dulaney, Jr., is chairman of the board; C. B. Page, president; Wm. E. Eberhart, vice-president and treasurer; and Jas. E. Moore, secretary and assistant treasurer. Directors include all of the officers and G. W. Dulany III, L. A. McDowell and W. R. Zitzewitz. Mr. Page has been a consulting engineer in Chicago for a number of years. His work included the direction of an organization, sponsored by the Dulany Trust, engaged in advanced engineering studies and experiments along the lines of automotive steam power.

The gas fired boilers now being placed on the market are produced in association with the Freeman Manufacturing Company, Racine, Wisconsin, and the National Machine Works, Chicago. The former are boiler manufacturers and the latter are specialists in gas combustion equipment. Mr. McDowell, a director of the new company, is president of the Freeman Manufacturing Co., and Mr. Zitzewitz, also director, is president of the National Machine Works.

Installations of the company's products have already been made in Chicago and plans are being prepared for introducing the line in other territories.

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J. H. HILL RETIRES FROM POST WITH PITTSBURGH EQUITABLE

J. H. HILL, who has for the past 22 years been connected with the Pittsburgh Equitable Meter Company, the last 15 of which he has been district manager at Los Angeles, California, has tendered his resignation, effective on December first, in order that he may devote his entire time to private business interests.

J. H. Hill

Walter H. Davis, who for the past 15 years has represented the Pittsburgh Equitable Meter Company in Kansas and Missouri, has been appointed to succeed Mr. Hill as district manager at Los Angeles. Mr. Davis will assume his duties there December first.

Coincident with the announcement of Mr. Hill's retiring, comes word that the Pittsburgh Equitable Meter Company has leased a large building at 1918 East Seventh St., Los Angeles, in the heart of the industrial district of the city. This building is modern in every respect and will be used as the company's Pacific Coast offices and plant. A complete stock of gas meters and gas regulators, water, oil and gasoline meters will be carried, with complete lines of repair parts for these products.

NATURAL PRODUCTION SHOWS EIGHT PER CENT INCREASE

A total of 1,658,139,000,000 cu. ft. of natural gas was produced in the United States and delivered to consumers during 1928 according to the report of the United States Bureau of Mines, Department of Commerce. An eight per cent increase is represented in this figure over 1927.

Canada and Mexico received 160,000,000 cubic feet of the gas which deducted from the production gives 1,567,979,000,000 cubic feet as the total consumption in the United States for the year.

NEW FEEDER MAINS TO IMPROVE PENDLETON, OREGON, SYSTEM

Northwest Cities Gas Company, operating in Oregon, is spending $15,000 in Pendleton, Oregon, laying new feeder mains. Four-inch cast iron pipe is being used for the new mains. The gas company will later undertake to replace all domestic gas services, according to R. E. Gaut, manager for the company at Pendleton.

CITIZENS GAS COMPANY GETS BOZEMAN, MONT., FRANCHISE

Citizens Gas Company, owned by Minneapolis interests, has secured a franchise for the service of natural gas in Bozeman, Montana, the gas to be delivered by October 1, 1930. Gas will be supplied from a northern Wyoming field, 150 miles away.

HELIUM COMPANY, INC., IS NEW COLORADO CORPORATION

Articles of incorporation have been filed in the state of Colorado by the Helium Company, Inc., of Louisville, Kentucky. The company plans to erect a plant near Thatcher, Colorado, for developing helium gas in that section. W. H. Girdler is president and E. S. Graff is secretary of the company.

Color is the dominant factor in the replacement of Gas Ranges to-day!

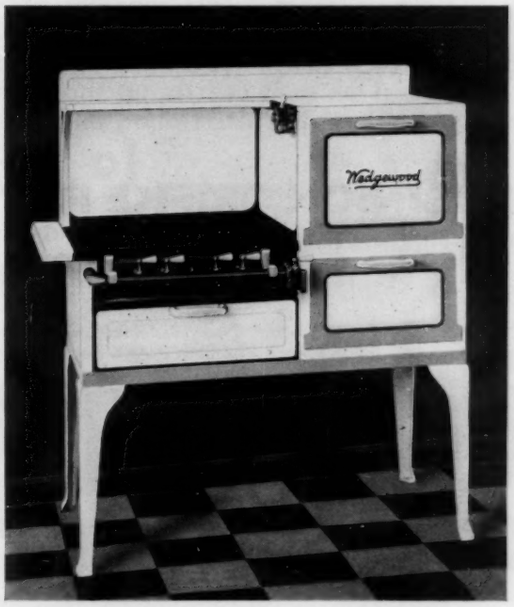
The old gas range still does its work satisfactorily. Cooks and bakes as good as ever.

Hence your only chance for a replacement is to sell this new, modern style idea "color."

Yes, "Color" is your one sure shot and the new soft ivory and cool green WEDGEWOOD is the last word in style, color and modern mechanical equipment. It fits right into almost any modern kitchen ensemble.

The Models shown here are from our De Luxe Line of all porcelain enamel gas ranges with

CLOSED TOP



Hear Ann Holden's Holiday Cooking Recipes

Listen to the Wedgewood Program every Tuesday at 11:10 a. m., KGO, KPO, KFI, KGW, KHQ, KOMO.
Enjoy the Wedgewood Little Symphony Orchestra, under direction of Max Dolin.

Wedgewood

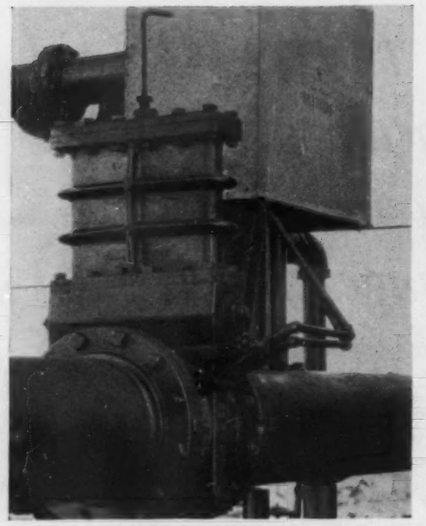
Quality-Service Since 1882

JAMES GRAHAM MFG. CO.
LARGEST STOVE MANUFACTURERS IN THE WEST
GAS RANGES - COMBINATION RANGES - RESTAURANT RANGES
GAS PLATES - WATER HEATERS - ROOM HEATERS
San Francisco Los Angeles Newark, Calif.

A Wedgewood For Every Purse

OVER A MILLION WEDGEWOOD RANGES IN USE!

OVER 11,000 IN USE



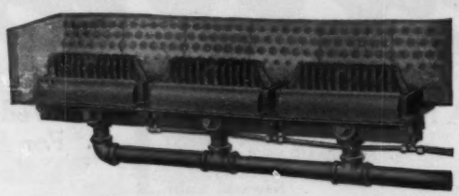
Simplicity Plus

NOTE the extreme simplicity of this Robinson installation. The cumbersome and expensive by-pass is completely eliminated. Observe the small amount of space necessary for this "hook-up." Economical, too. One man can set up the fitting in a very short time. Catalog and full description on request.

ROBINSON ORIFICE FITTING CO.
1435 SANTA FE AVENUE, LOS ANGELES, CALIF.
Distributors
The Foxboro Company . . Westcott & Greis, Inc.
English Distributor
Walker, Crosweller and Company
54-58 Queen Elizabeth Street, London, S. E. 1

ROBINSON
ORIFICE FITTING

R. M. C. Gas Burner



Unexcelled for Conversion Installation
ROTARY MANUFACTURING CO.
5720 Long Beach Avenue Los Angeles, California

ARKANSAS P. & L. COMPANY GETS FRANCHISES IN 13 TOWNS

Arkansas Power and Light Company, with general offices at Pine Bluff, has recently been granted natural gas franchises in 13 Arkansas towns, which will be supplied with gas from the Mississippi River Fuel Corporation line extending from north Louisiana to St. Louis.

Laterals from this line have already been completed to McGehee, Dermott, Lake Village, Eudora and Wilmot. Other towns where franchises are held are Newport, Walnut Ridge, Hoxie, Tuckerman, Kensett, Bald Knob, Jonesboro and Searcy. It is expected that gas will be served in these towns before the middle of January.

The city distribution system in each of the towns is being constructed by the Phoenix Utility Company, of which C. S. Lynch, chief engineer for the Arkansas Power and Light Company, is vice-president and general manager. Lateral lines to the communities are being constructed by Williams Brothers Construction Company, one of the contractors on the Louisiana-St. Louis line.

TEXAS OFFICES OPENED FOR GEO. D. ROPER CORP.

Texas offices have been opened for the George D. Roper Corporation in the second unit of the Santa Fe Building at Dallas, under the charge of J. C. Mansfield, representing the gas stove division and Lester B. Hyde, the pump division. The entire Roper line will be distributed through this office.

MONTANA TOWNS GRANT NATURAL GAS FRANCHISE TO A. H. PERKINS

A. H. Perkins and the Jones Oil Company have secured the natural gas franchises in the towns of Malta, Glasgow and Saco, Montana, and have announced that construction of the line from the Bowdoin structure to these towns will begin at once. Four ditching machines have been ordered, and the pipe for the line is already en route.

MISSOURI-KANSAS PIPE LINE CO. TO COMPLETE NEW MAINS

The Missouri-Kansas Pipe Line Company will bring to completion shortly 75 miles of line which the company is constructing in Missouri, Kansas and Kenutcky. The company now operates, exclusive of the new system, approximately 600 miles of main line and gathering system in the three states.

TEXAS CITIES GAS CO. MOVES DALLAS HEADQUARTERS

The Texas Cities Gas Company, one of the properties recently purchased by the Lone Star Gas Corporation, has moved its headquarters from 1615 Santa Fe Building, Dallas, to 1915 Wood St. H. E. Danner is vice-president and general manager of the company.

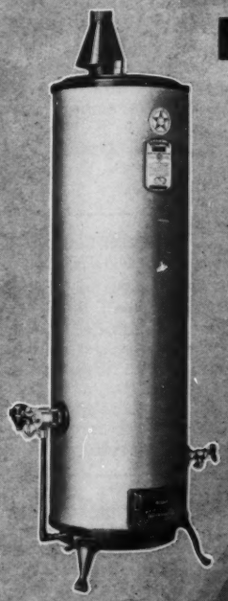
KANSAS G. & E. CO. OF WICHITA TO HAVE SERVICE BUILDING

Construction by the Kansas Gas & Electhic Company of Wichita, Kansas, of a general service building, costing approximately $500,000, will be begun in January, according to announcement. The building will house the general transmission department, the general meter department and the general storeroom department.

"SKIRTS WILL BE LONGER THIS WINTER"..

RADIANT ROOM HEATER

Just as Poiret, Chanel, Lelong and other master designers of women's wear have established an international reputation for setting the style with their originality and flair for what is exactly right in the mode of the minute, *so Welsbach stands as the international authority on what is right in the field of gas appliances.*



HOTZONE

As a buyer, you must consider appearance, efficiency, construction and price of radiant room heaters and water heaters. On these fundamentals, Welsbach, an original investigator, a leading manufacturer for over forty years, has maintained its position of authority by ceaseless effort and activity. The name Welsbach on these important appliances is a guarantee of their essential *rightness* from every viewpoint. That this is appreciated is shown by the fact that Welsbach room heaters and water heaters hold their old friends year after year and add new ones continually. Welsbach Company, Gloucester City, N. J.

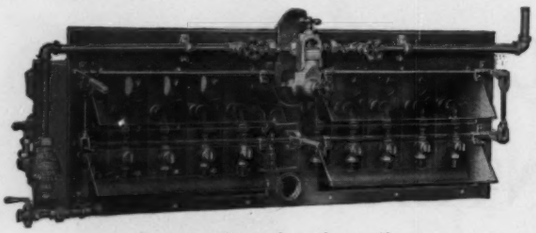
Pacific Coast: 50 Hawthorne St., San Francisco, Calif.

Member American Gas Association • ***Member Pacific Gas Association***

Welsbach

The Leahy Multi-Jet Unit

Is an investment that will increase operating efficiency and decrease operating cost



Patents allowed and pending
View showing Combination Gas and Oil Unit

Designed for Front, Rear and Vertical Firing, Burning Efficiently Low or High Pressure Natural or Manufactured Gas

Exclusive features that have created exceptional demand for this unit:

1—Designed with no draft loss.
2—High overloads on low gas pressures with minimum draft.
3—Each individual burner receives correct air and gas mixture for maximum efficiency.
4—Auxiliary air opening around tile increases overload capacity of unit with no sacrifice in efficiency.
5—Correct amount of air for combustion can be obtained with minimum opening in stack damper, which retains heat in boiler instead of letting it escape up the stack.
6—Does not require high gas velocities through burner in order to draw sufficient air for combustion.
7—All primary and auxiliary air is admitted through unit and evenly distributed to each burner.
8—Equal distribution of heat full width of firebox.
9—All parts individual and removable.
10—The oil burner can be inserted in the unit or removed instantly.
11—Equal efficiency on gas or oil.

An Efficient, Indestructible, Portable Unit with a Low Initial and Upkeep Cost

Request literature, data, and installation prints on our

Oil and Gas Burning Equipment

LEAHY MANUFACTURING COMPANY

1804-1810 East 8th Street Los Angeles, Calif. Established 1902

To all of our good friends, with whom we have forgathered and occasionally conspired to the end that gloom and dull care might be put to flight, we express the sincere hope that these two imposters may be routed for all time during this, our 1929 Christmas season.

C. B. BABCOCK CO.

San Francisco Los Angeles

MONTERREY, MEXICO, GAS LINE COMPLETE DECEMBER 15

Announcement has been made by the United Gas Company of Houston, Texas, constructing the natural gas line from southwest Texas gas fields to Monterrey, Mexico, of the completion of the American side of the line and the completion of 73 per cent of the Mexican side. The entire project is expected to be completed around December 15.

The line originates in the Jennings field in Zapata County, crossing the Rio Grande at Roma, Texas. The distance from Roma to Monterrey is 96 miles. The total length of the line is approximately 143.34 miles. It is being constructed of 12¾-inch OD pipe.

A Mexican subsidiary, the Compania Mexicana de Gas, S. A., has been formed by the United Gas Company, to wholesale the gas to the Monterrey distributing company, and to sell direct to some of the major industries at Monterrey and to those contiguous to its lines en route to the city.

OVER HALF MILLION GAIN FOR OKLAHOMA NATURAL

Oklahoma Natural Gas Corporation has reported its gross earnings for nine months ending September 30 as amounting to $8,081,202. Gross earnings for the corresponding period in 1928 were $7,480,359.

The earnings for 12 months ending with the same date were $10,697,558 as compared with $10,096,715 for the year ending December 31, 1928. The net operating income was $4,470,893 for this year as against $4,004,069 for the calendar year of 1928. Headquarters for the company, which is a subsidiary of the American Natural Gas Corporation, are at Tulsa, Oklahoma.

TEXAS CITIES OFFICIALS FETED BY LONE STAR GAS CO.

The Lone Star Gas Company, of Dallas, which recently purchased the Texas Cities Gas Company, acted as host to out-of-town officials of the Texas Cities organization on the 19th and 20th of November. Among the officials attending were P. E. Nichols of Galveston; A. G. Dibbens, Guthrie, Okla.; R. S. Reading, El Paso; C. V. Allin, Waco; and J. M. Grimes, Paris.

INDUSTRIAL EXPOSITION TO BE HELD IN CHICAGO IN MARCH

The American Industrial Factory and Production Exposition will be held in Chicago, Illinois, in March, 1930, under the direction of the Midwestern Engineering Exposition, Inc., 308 West Washington Street, Chicago, Illinois.

Manufacturers of gas appliances interested in securing space are requested to write to the above address.

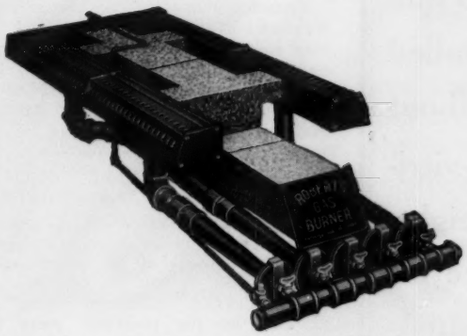
CANADIAN GAS ASS'N. TO HOLD 1930 GATHERING AT HALIFAX

At the recent meeting of the Canadian Gas Association it was decided to hold the 1930 conclave at Halifax, Nova Scotia, June 24-25, 1930. G. W. Allen of 21 Astley Avenue, Toronto, is secretary of the Association.

F. I. COLLIE TO MANAGE OFFICE AT CLARKSVILLE, TEX.

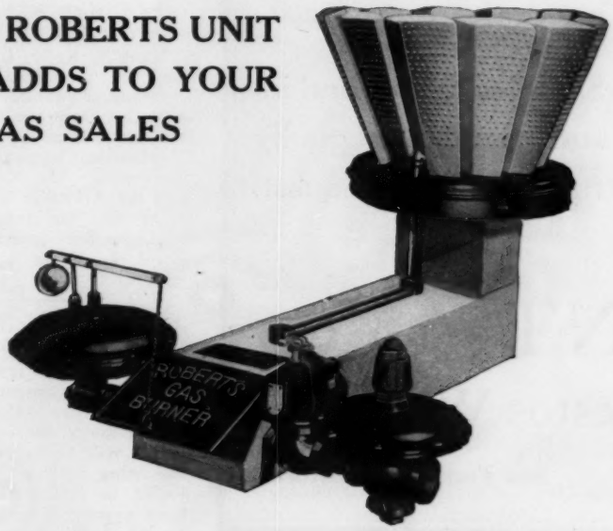
The Community Natural Gas Company, with headquarters at Dallas, Texas, announces that F. I. Collie, formerly construction foreman of the company, has been named to manage the Clarksville, Texas, office of the company.

There's a Roberts Unit to fit every size and type of heating plant



MOST HEAT PER DOLLAR

EVERY ROBERTS UNIT SOLD ADDS TO YOUR GAS SALES



SELL MORE GAS BY SELLING ROBERTS CONTROLLED GAS HEATING UNITS

WRITE TODAY FOR CATALOG AND HOUSE HEATING DATA BOOK

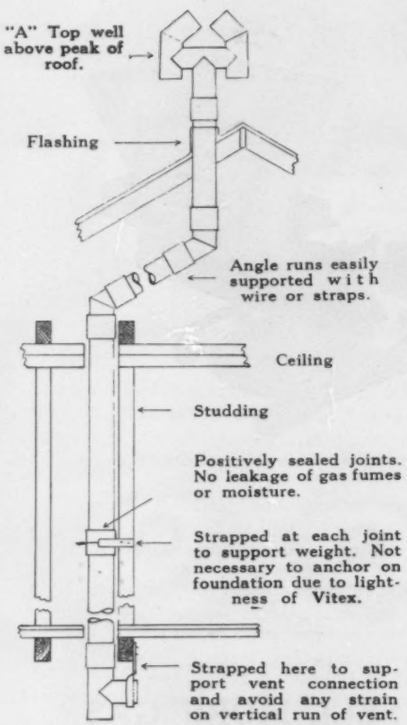
ROBERTS-GORDON APPLIANCE CORPORATION

DELAWARE AVENUE AT TUPPER STREET

CURTISS BUILDING BUFFALO, N. Y.

VITEX The Perfect Gas Vent & Flue Pipe

Illustrating Method of Installing Vitex on Concealed Runs.


"A" Top well above peak of roof.
Flashing
Angle runs easily supported with wire or straps.
Ceiling
Studding
Positively sealed joints. No leakage of gas fumes or moisture.
Strapped at each joint to support weight. Not necessary to anchor on foundation due to lightness of Vitex.
Strapped here to support vent connection and avoid any strain on vertical run of vent.

Solves the venting problem where no flue exists. Can be installed at low cost without foundation. Semi-vitrified, light in weight, absolutely non-corrosive and high in insulating value. Improves combustion by increasing draft.

Samples, prices and installation data gladly furnished on request.

PLANT
Rubber & Asbestos Works

537 Brannan Street **San Francisco, California**

IMUNOL

NEBRASKA PIPE LINE COMPANY IS NEW IN FIELD

Announcement has been made of the incorporation of the Nebraska Pipe Line Company, with a capitalization of $1,500,000, formed for the purpose of piping natural gas to towns and cities in central and southern Nebraska.. Clement L. Studebaker of Chicago is president of the company, which plans the immediate construction of a system serving the following towns: Crete, Wiber, Ashland, Chester, Deshler, Fairfield, Clay Center, Harvard, Sutton, Blue Springs, Syracuse, Wahoo, Davenport, Edgar, Shelton, Wood River, Hebron and Gibbon.

Franchises are held in the towns by the Nebraska Natural Gas Company, an affiliated company of the Nebraska pipe line organization. The name of the Nebraska Pipe Line Company is also associated with a proposed project to bring natural gas to Lincoln and Omaha.

HOUSTON PIPE LINE CO. OFFICERS TOUR COMPANY PROPERTY

Headed by Frank W. Kirk, general manager of the Houston Pipe Line Company, a party of officials of the organization made a tour of inspection of properties in South Texas. Industries using gas distributed by the company were the focal points of the inspection, and included the Freeport Sulphur Company at Freeport, the Texas Gulf Sulphur Company at Gulf, as well as properties in Harris, Fort Bend, Brazoria and Matagorda counties.

FRANK S. KELLY GEN'L. SUP'T. OF SO. CITIES COMPANY

Frank S. Kelly, formerly industrial engineer for the Arkansas-Louisiana Pipeline Company, a subsidiary of the Arkansas Natural Gas Corporation, has been named general superintendent of the Southern Cities Distribution Company, another subsidiary, of Shreveport. Mr. Kelly has been associated with the Arkansas Natural since 1926, prior to the time the company was purchased by the Cities Service interests. He is a graduate of the Texas A. & M. as a mechanical engineer.

GAS SERVICE GETS FRANCHISE AT AURORA, MISSOURI

A natural gas franchise was granted the Gas Service Company, a Doherty organization, at Aurora, Missouri, on November 7 by vote of the townspeople.

Gas will be served at Aurora through a line being constructed from a point south of Joplin to Springfield. Other towns which have granted franchises, and which will be served from the same line, are Monett, Pierce City, Marionville, Billings and Republic.

SAN MARCOS, TEXAS, NOW ON LIST OF NATURAL GAS USERS

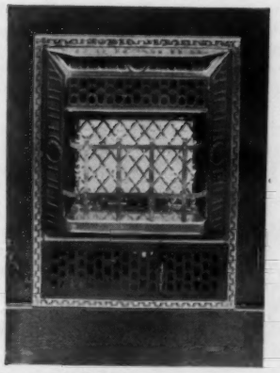
Natural gas is now being served at San Marcos, Texas, through gas mains constructed by the Southern Gas Utilities Inc., a subsidiary of the United Gas Company. Actual construction on the city gas system began on September 9. R. M. Nicol is manager of the company's office at San Marcos.

HOUSTON PIPE LINE CO. BUILDS 20-MILE, 16-INCH LOOP

As a part of a plan to increase its gas supply to Houston, Texas, the Houston Pipe Line Company completed recently a 20-mile loop in its line at a point near Victoria. The loop was of 16-inch pipe.

Pacific A. G. A. Approved Appliances

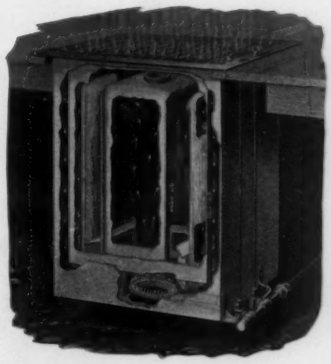
will get you in on every heating job in your territory



"Pacific" No. 02 Floor Furnace

Approved by A.G.A.

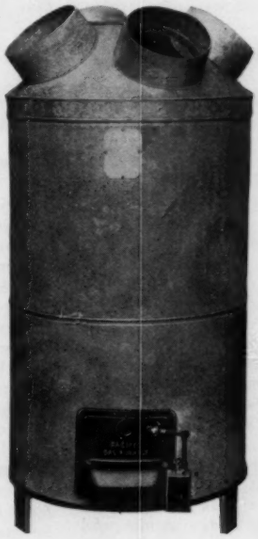
A sturdily constructed pipeless Unit of 20 gauge Ingot Iron with an attractive floor grill of heavy cast iron, finished in antique bronze or brass. Heating element has top and bottom of cast iron, assuring many years of uninterrupted service.



Wall Heaters

—Two Models

Models 7 and 8-A Wall Heaters are equipped with the Multi-tubular burner which has proven so popular and efficient in other "Pacific" products. The attractive appearance and sturdy construction coupled with its efficiency in rendering cheerful heat will prove a quick seller and should be displayed on your sales floor.



The Pacific Furnaces, with the recognized advantages of the "round" design, eliminates all corners and dead air spaces. It promotes better circulation, giving an abundance of heat more quickly. The heating element is completely welded throughout, is gas tight, and permits no combustion fumes to escape. The heating unit is of 20-gauge pure Ingot Iron metal. They are equipped with the special Multi-Tubular Burner.

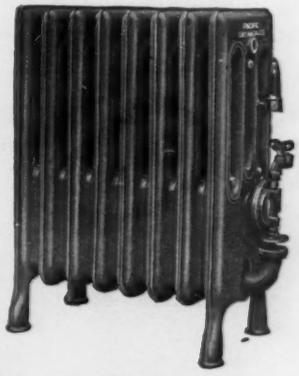
The Multi-Tubular Burner

Each burner has its independent injection of gas. Primary air for combustion is directly siphoned at each burner. There is no need for adjusting of the gas and air for combustion, as this new Pacific Burner is scientifically designed to automatically give the correct proportion of air to gas. This results in complete combustion and a high temperature flame of proven economy. No soot. No odors.

Gas Steam Radiators

The Pacific Unvented Gas Steam Radiators are now available in four column pattern. A size for every demand, 26, 32, and 38 inches high. The Pacific Gas Steam Radiators are approved by both the American Gas Association Laboratory and the Underwriters Laboratories.

Our agency proposition is very attractive—write for particulars concerning your locality.



Get in on Every Heating Job in Your Territory

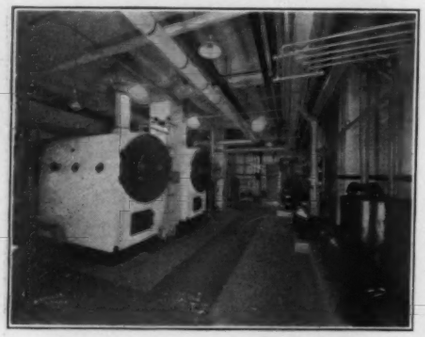
Pacific Gas Radiator

Gas Heating **Company** *Headquarters*

Roseberry and Walter Streets, Huntington Park, California

Manufacturers of Every Type of Gas Heating Appliances

WEBSTER
RADIANT
GAS BURNERS
in the
HEATING FIELD



Webster Radiant Gas Burners in the Oklahoma Natural Gas Corporation Bldg., Tulsa, Okla.

Office Buildings, Masonic Temples, Schools, Churches, Y. M. C. A.'s, Laundries, Banks, Apartment Houses, Hotels, Industrial Plants—wherever there's heating to be done, you'll find representative Webster Radiant Gas Burner installations to point to with confidence as examples of satisfactory, economical and efficient firing of heating boilers or furnaces.

We'll be glad to send a list of installations to show prospects what the Webster Burner has done in your territory.

Call on us for advice, service and sales aid.

WEBSTER
ENGINEERING
COMPANY
Tulsa, Okla.
DIVISION OF
The Surface Combustion Co. Inc.

U. S. Gas Utilities *to* Spend $425,000,000 *in* 1930

OFFICIALS of utility companies, in a utilities conference with President Herbert Hoover on November 27, outlined a program of expansion for 1930 covering expenditure of more than $2,000,000,000, representing an increase of $110,000,000 over 1929 budgets, and not including maintenance expense, according to late news dispatches.

Representing the American Gas Association at the conference, B. J. Mullaney, president, said:

"Expenditures for construction by the manufactured and natural gas industry of the United States in 1930 will aggregate approximately $425,000,000, an increase of about 6 per cent over the corresponding expenditures in 1929. An additional $50,000,000 will be expended to maintain existing service facilities.

"The construction estimate is based primarily upon budget provisions already formulated for 1930 by companies representing the major part of gas production and distribution in the United States. The conclusions thus indicated have been checked against the actual experience of the industry for many years, as well as against current observation and information, and have been correspondingly strengthened."

Among utility executives present at the conference, those representing the gas industry were: B. J. Mullaney, vice-president of the Peoples Gas Light and Coke Company, Chicago, Illinois, and president, American Gas Association; George B. Cortelyou, president, Consolidated Gas Company of New York; C. E. Paige, vice-president, Brooklyn Union Gas Company, Brooklyn, New York; Herbert A. Wagner, president, Consolidated Gas, Electric Light & Power Company, Baltimore, Maryland; P. G. Gessler, president, and W. W. Freeman, vice-president, Columbia Gas and Electric Company, New York; John P. Zimmerman, president, the United Gas Improvement Company, Philadelphia; George M. Kidd, president, American Gas and Electric Company, New York; Halford Erickson, vice-president, Byllesby Engineering and Management Corporation, Chicago; Thomas N. McCarter, president, Public Service Electric and Gas Company, Newark, New Jersey; W. A. Jones, vice-president, Cities Service Company, New York, and Samuel Insull, president, Peoples Gas Light and Coke Company, Chicago.

MORE OKLAHOMA TOWNS ADDED TO NATURAL GAS LOAD

Several towns in western and southern Oklahoma will receive natural gas for the first time within the next few months. Gas distribution systems are being constructed in Carnegie, Mountain View and Fort Cobb by the State Fuel Supply Company. This company may also extend its lines to Gracemont, Binger, Geary, Lookeba, Bridgeport and Hinton.

The Consolidated Gas Utilities Company is constructing a distribution system at Hammond, and the Public Service Corporation of Texas is seeking franchises at Shattuck, Gage and Fargo. A distribution system is also underway at Tishomingo and Madill. The Cimarron Utilities Company has brought to completion a gas line from Hooker to Beaver and Forgan. The Community Natural Gas Company has piped gas to Snyder, Manitou and Mountain Park, and the Northwest Texas Gas Company is constructing a gas line to serve Atoke and Coalgate.

AMERICAN RADIATOR AND STD. SANITARY CORP. ON AIR

The American Radiator and Standard Sanitary Corporation on November 16 began a series of broadcasts over the national network, by presenting the Puccini opera "Madame Butterfly." There will be six presentations, during which a few moments will be taken to set forth the advantages of modern styles in heating and plumbing.

The final opera in the series will be broadcast over the red network hook-up on Saturday, December 21.

E. T. MOORE IS PRESIDENT OF MID-CONTINENT O. & G. ASS'N.

Edward T. Moore, president of the Simms Oil Company of Dallas, Texas, was elected president of the Mid-Continent Oil and Gas Association at the annual meeting recently held in San Angelo.

CUT BANK, MONT., VOTES TO GRANT NATURAL FRANCHISE

Cut Bank, Montana, recently voted to grant a natural gas franchise to the Drumheller company, which owns a producing well near the town. Pipe lines are under way to distribute the gas.

FIFTEEN LOUISIANA TOWNS WANT NATURAL GAS SERVICE

Governing officials of 15 towns in Southern Louisiana have instituted a movement to bring natural gas to their cities. They are conferring with representatives of gas and pipe line companies throughout the state in addition to building public interest in favor of gas, in the section.

The following cities have joined in the movement: Lake Charles, Lafayette, DeRidder, Morgan City, Welsh, Marksville, Eunice, Abbeville, Crowley, DeQuincey, Opelousas, Rayne, Baldwin, New Iberia and Jennings.

It is pointed out by those responsible for the movement that southwest Louisiana has a population of more than 400,000 within 150 miles east and west between Lake Charles and Morgan City and south of Vernon and Rapides Parishes to the gulf. There are more than 48 towns in the section and 6,000,000 acres of fertile land. There would be many industrial consumers in the section as well as a large number of domestic consumers.

CENTRAL STATES ELECTRIC CO. BUYS WATER GAS SET

The Central States Electric Company of Cedar Rapids, Iowa, has awarded contract to The U. G. I. Contracting Company division of United Engineers & Constructors, Inc., of Philadelphia, for one 5-foot cone top U.G.I. carburetted water gas set with Chrisman cycle, and circular steel platform. The set will be arranged for the use of bituminous coal as generator fuel and will be operated from the ground floor.

BLUE SPRINGS, MO., GRANTS NATURAL FRANCHISE

Blue Springs, Missouri, has granted a gas franchise to Shipped, Madden & Parrish Pipe Line Company. Gas will be piped from a field being developed four miles southwest of the city.

TEHUACANA, TEXAS, TO HAVE GAS FROM LONE STAR MAINS

Tehuacana, Texas, is to be supplied with natural gas from the mains of the Lone Star Gas Company, of Dallas, Texas.

Time tried - eight years continuous service

Since 1921 the Erickson Gas-O-Trol in its **original design** has been continuously on the market and enjoyed a steady and consistent increase in sales volume every year. No radical changes--only a few refinements found advisable--and many of the first year installations have been giving most satisfactory uninterrupted service throughout their eight years of constant use.

ARTHUR F. ERICKSON COMPANY

Manufacturers

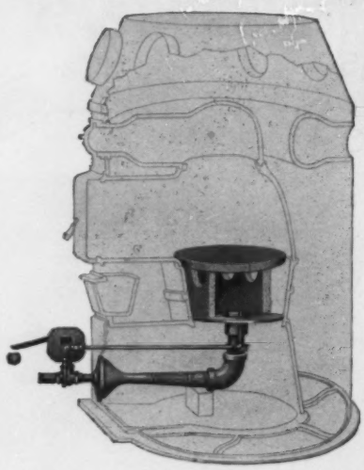
557 Market Street, SAN FRANCISCO, CAL.
Selling Building, PORTLAND, OREGON
Terminal Sales Building, SEATTLE, WASH.

Pacific Coast Distributors:

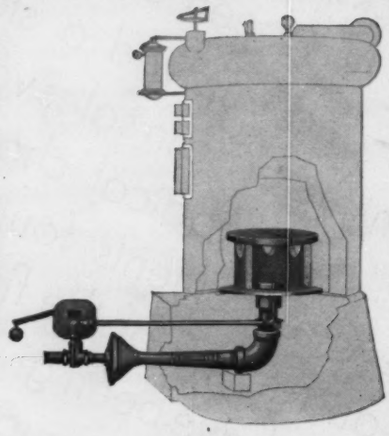
MINNEAPOLIS-HONEYWELL HEAT REGULATORS

MAXON

Conversion Gas Burners



The above is an application to a warm air furnace. The burner is easily installed and the unit is fool-proof, making it a very dependable conversion unit for gas companies to recommend and sell.



This is an application to a round boiler. The burner is equipped with a snap-acting valve which can be attached to the existing furnace chain and manually controlled from upstairs. Either automatic or hand-controlled is recommended.

Pacific Coast Representative

The T. G. ARROWSMITH CO.
661 Howard St.
San Francisco, Calif.

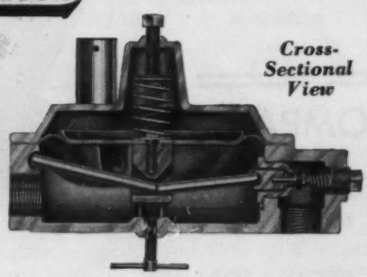
MAXON PREMIX BURNER CO.
INDUSTRIAL FUEL BURNING EQUIPMENT — FOR OIL OR GAS, OR BOTH COMBINED
MUNCIE — MAXON PREMIX BURNER — INDIANA

Reynolds
Gas Control Since 1892

Products for all kinds of Pressure Reduction—for either artificial or natural gas.
GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.
REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.
VALVE—Automatic Quick Closing Anti Vacuum.

Reynolds Gas Regulator Company
Anderson, Indiana

Reynolds Little Giant Regulator



Cross-Sectional View

C. R. MINOR PRESIDENT OF OIL AND GAS ASSOCIATION DIVISION

C. R. Minor, vice-president of the Gulf Refining Company, has been chosen as president of the Louisiana-Arkansas division of the Mid-Continent Oil & Gas Association for the ensuing year. Other officers elected were F. Ray McGrew, Standard Oil Pipe Line Company, first vice-president; J. R. Crawford, Lake Charles, vice-president; Ben Johnson, Shreveport, re-elected treasurer; Joseph B. Elam, Shreveport, re-elected secretary.

MONROE TO SHREVEPORT GAS LINE COMPLETED NOV. 1

Announcement has been made of the completion, on November 1, of the 137-mile gas line constructed by the Arkansas-Louisiana Pipe Line Company, a subsidiary of the Arkansas Natural Gas Corporation from Monroe to Shreveport and Waskom.

At Waskom gas is supplied to the Dixie Gulf Gas Company, a subsidiary of the United Gas Company, for its trunk line delivering gas to Houston and Port Arthur. The line is 20 inches in diameter.

THE BRISTOL COMPANY NOW HAS BRANCH IN LOS ANGELES

The Bristol Company has established a branch office and stockroom at 703 Terminal Sales Building, 747 Warehouse Street, Los Angeles. Formerly an emergency stock only was carried in that city.

The men now connected with this new branch office are: S. W. Case, district manager; F. W. Borchers, sales and service engineer; and C. M. Willis, service engineer. The Bristol Company also has a branch office at 727 Rialto Building, San Francisco.

NEW HOLDER FOR P. G. AND E. AT LOS GATOS, CALIF.

A new gas holder of the cylindrical high pressure type has recently been completed by the Pacific Gas and Electric Company at Los Gatos, California. Built at a cost of $20,535, it is 106 feet long and 20 feet in diameter and has a capacity of 100,000 cubic feet. The gas supply is pumped from the company's plant at San Jose. Tanks of similar design are being built at Colusa and Woodland for the company.

SO. CAL. GAS CO. PETITIONS TO SERVE MERCED CO. TOWNS

Southern California Gas Company, with headquarters in Los Angeles, California, has applied to the California Railroad Commission for a permit to exercise franchise rights for the distribution of natural gas in the cities of Livingston and Atwater, Merced County.

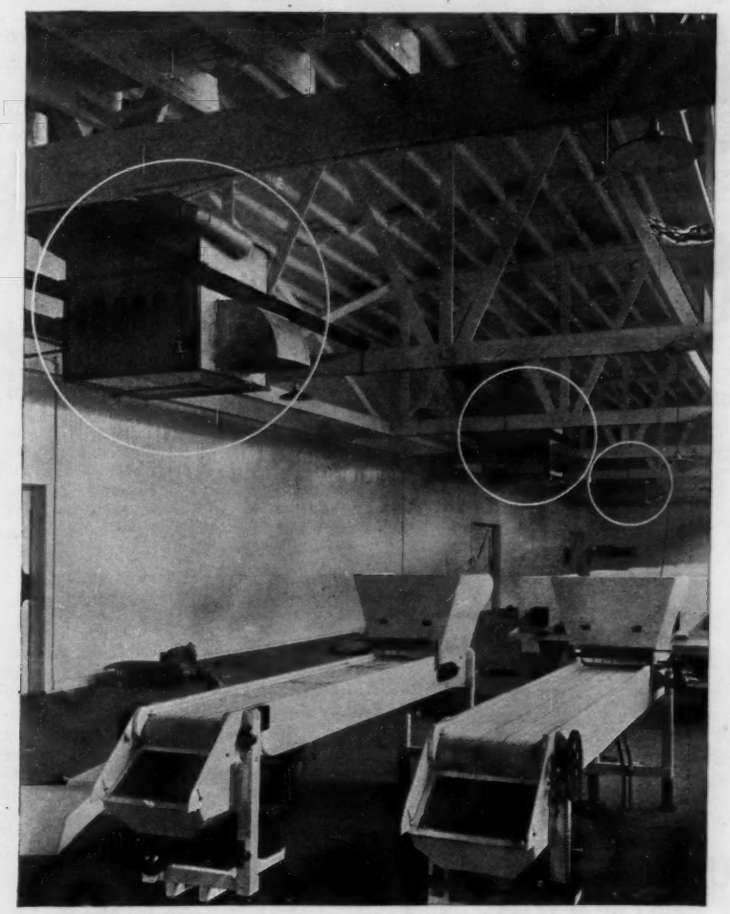
ARKANSAS NATURAL BUILDING LINE TO CAMDEN

Arkansas Natural Gas Corporation is constructing a 30-mile all-welded gas line from Camden, Arkansas, to serve Fordyce and two nearby towns with natural gas. The combined population of the towns is 6,000.

WESTERN DISTRIBUTOR NAMED FOR VICTAULIC COMPANY

Announcement has been made that the Ducommun Corporation of Los Angeles and San Francisco will distribute Victaulic couplings for gas, oil and water lines in western territory from Salt Lake City to the Coast.

HEAT! without floor drafts



Three of the five Payne Overhead Factory Units installed by California Walnut Growers to insure sanitary, healthful working conditions in new Los Angeles plant.

New Type Overhead Furnaces Spray Heat from Above in Winter...Cool Air in Summer!

PAYNE

Overhead Factory Units provide comfortable, economical and easily controlled heat for factories, shops, garages, workshops, auditoriums, commercial lofts and all large buildings at a moment's notice—without the trouble and expense of elaborate "central plant" systems. Each Unit is a complete, self-contained and individually controlled heating plant, equipped with electrically-driven fans. Payne Overhead Factory Units conserve floor space and provide comfortable working conditions at lowest possible cost.

Blue prints and complete information on request.

PAYNE FURNACE & SUPPLY CO., INC.

BEVERLY HILLS, CALIFORNIA

Payne Heat

Unit Furnaces
Floor Furnaces
Central Furnaces
Industrial Installations
Pipeless Wall Units
Factory Units

Payne Engineering Service

Architects, Building Contractors and Heating Engineers are invited to put their troublesome warm air heating problems up to Payne Engineers. Send floor plans and full details of heating requirements. No matter how large or how small your installation may be, the Payne Furnace & Supply Co., Inc., is ready to cooperate with you.

Payne

THERE IS A "PAYNE HEAT" SYSTEM FOR EVERY BUILDING AND CLIMATE

There Is a Big Market

for Gas Conversion Burners

Hundreds of your customers are looking for economical equipment to convert their present boilers to automatic gas heaters.

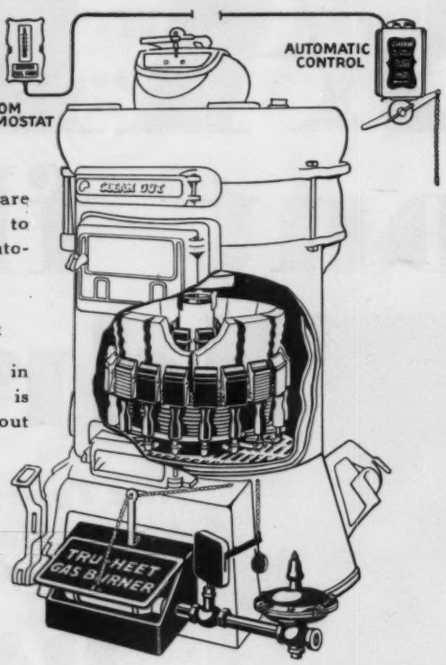
THE TRU-HEET Automatic Burner Unit

can be quickly and easily installed in all types of heating boilers. It is placed right on the grate bars without dismantling the furnace.

Write for attractive net prices

TROOP WATER HEATER COMPANY

2516-26 Jane Street
Pittsburgh, Pa.



ZINK BURNERS

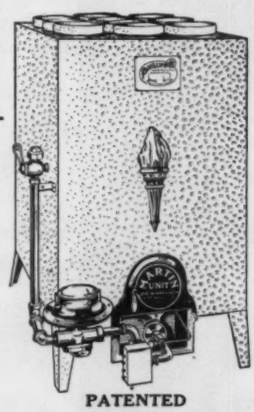
For All Purposes

Flame Burners
Short Flame Burners
Flameless Burners

Zink Burners help connect up industrial consumers by their low cost and simple installation, and keep them connected by their efficient and satisfactory performance.

JOHN ZINK CO.

Oklahoma Natural Gas Building,
Tulsa, Oklahoma



PATENTED

Martin Unit Gas Furnaces

ARE THE RESULT OF 38 YEARS HEATING EXPERIENCE
MADE IN FOUR SIZES
Electric, Thermostat or Manual Control
Approved by A. G. A. Laboratory and by the City of Los Angeles
Write for your copy of "Modern Heating Methods"

PHILLIPS HEATING, VENTILATING & MFG. CO.

1710 W. Washington St.
Los Angeles, California

Live Agents Wanted

TESTING LABORATORY AGA APPROVED

NATURAL GAS NOW SERVED IN SAN JOSE, CALIFORNIA

Natural gas has been introduced into San Jose and neighboring communities through the mains of the Pacific Gas and Electric Company. The change-over from manufactured to natural was successfully accomplished by 450 trained workers, the regular crew at the San Jose plant being augmented by 250 men from San Francisco, 130 from Oakland, and 35 from peninsula cities. The 450 men were split into crews and assigned to definite subdivisions under captains. Each workman had 10 addresses for his day's task and the crews went from house to house readjusting all appliances and satisfying themselves, the captains and the consumers that every burner worked properly. Preferential service was given to hospitals, hotels, restaurants and industrial plants, where loss of fuel for any considerable period would have resulted in inconvenience or damage.

Each day showed 80 per cent of the day's quota of consumers safely "cut over" to the new fuel. The other 20 per cent were away from home or used appliances on which parts had to be rebuilt.

The same system was followed in all of San Jose's five districts and in Mayfield, Sunnyvale, Mountain View and Santa Clara.

H. C. Ross, division manager for the P.G. and E. at Fresno, Calif., is now in charge of change-over operations for the company's entire system, making his headquarters in San Francisco.

CONNERSVILLE EXECUTIVE DIES IN HEART ATTACK

Robert T. Huston, vice-president and superintendent of the Connersville Blower Company, died in Connersville, Indiana, on the evening of November 14, 1929, due to an acute heart attack.

Mr. Huston had been connected with the Connersville Blower Company since its organization in 1893. In addition to his interest in building up and maintaining the factory equipment and efficiency, he was active in other industrial, civic, lodge and social work of the city.

BLYTHEVILLE, ARK., TO HAVE NATURAL BY APRIL

Natural gas will be available at Blytheville, Arkansas, before April, according to the Cherokee Public Service Company of Muskogee, Oklahoma, holder of the gas franchise. The gas will be piped through a line to be constructed from Hoxie, on the Louisiana-St.Louis natural gas line to Paragould and Blytheville. The Cherokee Public Service Company is affiliated with the Morgan Utilities interests.

WACO, TEXAS, GETS LOWER NATURAL GAS RATES

Texas Cities Gas Company, on November 19th, put into effect a lower gas rate at Waco, Texas. Waco consumers will pay, under the new rate, a minimum charge of $1.00 for the first 700 cubic feet of gas; for next 19,300 cubic feet, 67½ cts. per thousand; for the next 10,000 cubic feet, 65 cts. per thousand; for the next 20,000 cubic feet, 60 cts. per thousand; for all over 50,000 cubic feet, 50 cts. per thousand.

A. L. SPRING MAKES TRIP TO ELECTROLUX FACTORY

A. L. Spring, president and general manager of California Servel, Inc., factory distributors for Electrolux gas-fired refrigerators, returned to Los Angeles recently from a trip to the factory at Evansville, Indiana.

BARBER *Automatic* JET GAS BURNERS

HAVE NO EQUAL IN THE "CONVERSION" FIELD WHEN SAFETY—EFFICIENCY—ECONOMY—DURABILITY AND SIMPLICITY OF INSTALLATION AND OPERATION ARE CONSIDERED

No. 3-R-17-R Barber Automatic Burner
(Made in Four Sizes, as Listed Below)

A COMPLETE AUTOMATIC CONVERSION GAS BURNER LINE—FOR 90% of your inquiries at prices attractive to every home owner.

Barber Automatic Burners (as illustrated above) include the following items—all Completely Assembled:

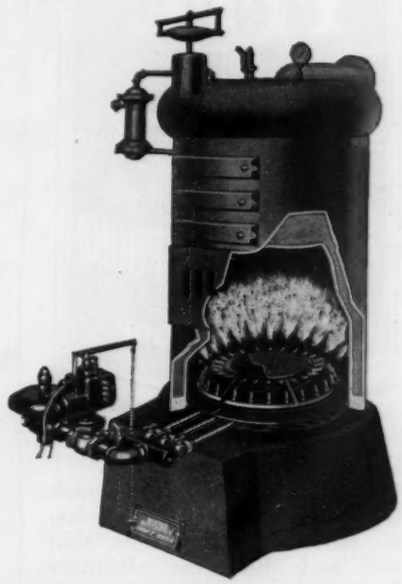
Complete Burner Assembly including Upper and Lower Baffles, Manifold, and Gas Shut-Off Cocks to each Burner Unit. Also Butterfly Draft Door Assembly and Minneapolis Room Thermostat.

Specifications and List Prices

Barber Burner Number	Grate Dia. Inches Inclusive	List Price A	List Price B	List Price C	List Price D
2-R-17-R	16 to 18	$ 84.00	$110.00	$124.00	$156.00
3-R-17-R	19 to 23	94.00	120.00	134.00	166.00
4-R-17-R	24 to 27	104.00	130.00	144.00	176.00
5-R-17-R	28 to 31	119.00	145.00	159.00	191.00

Note:—List Price A—WITHOUT Room Thermostat.
List Price B—With Minneapolis No. 4010—Plain Room Thermostat.
List Price C—With Minneapolis No. 4710—1-day Clock Room Thermostat.
List Price D—With Minneapolis No. 7710—8-day Clock Room Thermostat.
When ordering be sure to state type of Thermostat desired.

There is a proper Barber "Conversion" Assembly for practically every house heating requirement—for warm air, steam, vapor, or hot water heat.



Illustrating the New (No. 3-R-17-R) Barber Automatic Conversion Burner Installed in a Round Boiler —thru the clinker door opening, without removal of grate bars.

You can *sell* and *install* these modern scientific —moderately priced—Automatic Conversion Gas Burners—with very little effort—right in your own neighborhood, upon our "Specification Data Sheet" plan and reap a good harvest in *profits* and *friends*.

Remember — every Barber installation sells many more. Our Engineering Department will gladly specify every inquiry if furnished with the Trade Name, Manufacturer's Name and Number of the Furnace or Boiler. Write us at once for details, *discounts* and sales literature.

The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3102-04 Superior Avenue. Cleveland, Ohio

GAS
or
WATER
Connections

whether screw thread or gasket, should be made up with KEY TITE PIPE JOINT COMPOUND.

KEY TITE PIPE JOINT COMPOUND is not a quick hardening cement, but a plastic lubricant and a filler that will seal the most obstinate joint with ease. It covers more surface than an equal volume of red or white lead, thereby reducing the cost. It is waterproof—and there is no waste.

Manufactured by

E. A. Key Co., Inc.

2814 Santa Fe Ave.
Los Angeles, Calif.

Distributors in all principal cities.

WRITE FOR FREE SAMPLE

Procedure *for* Cleaning *and* Testing *a* Natural Gas Line

(*Continued from Page 33*)

is closed, the open end can be connected and the valve at that point closed. If a plain end coupling is on either side of the valves, it should be blocked or fastened with turnbuckles and clamps to prevent it from moving or blowing off. The men at the source can then be advised to turn the gas in, allowing the pressure on that section to gradually build up to the highest pressure to which the line will be subjected when in service. A pressure gauge should be attached to the pipe line at each end, so that if a break should occur, it can be noted immediately and the gas supply can be cut back; enough should be allowed to pass through to assist in locating the leak. Small gauge lines should be temporarily laid back from the valve for about 100 feet to protect those reading the gauge, in case of a bad break near the valve.

After the full test pressure has been put on the line, it should be allowed to stand for at least an hour and *no one* should be allowed to patrol the line for leaks before the expiration of that time. When the line is in open country, the total distance blown and tested in one day can be left under full pressure all night.

Any leakage on a section of line can be determined, if desired, by calculating the loss in volume from observations of the pressure drop for successive equal periods of time. These pressure drops can be most accurately determined by the use of dead weight testers, instead of pressure gauges; by this method leakage can be determined in much shorter time than by using charts or recording gauges. Pressure observations should not be made before one-half hour after shutting in the section of line being tested, which allows the pressure on the line to equalize. When the section of line being tested is buried, and the gas is not flowing, a constant temperature may be assumed, but for most accurate results, temperatures should be observed by the use of mercurical thermometers placed in the thermometer wells in the pipe line.

After the blowing and testing of the first section, the second section should be purged of air and cleaned, and the same procedure followed as before, with two men remaining at the valve at the source of supply.

After the second section has been tested and found tight, the men operating the valve at the source can move forward five or 10 miles, keeping the first section full of high pressure gas. These men can then move forward after each section is tested, thus having a tested section ahead of them and a line full of high pressure gas back of them at all times.

At the point where the line is blown, on lines of large diameter, the size of the pipe should be reduced and a smaller size valve used to blow through. This valve should be placed on the blow-off pipe so that it can be closed easily and quickly in case of trouble or if the gas should ignite. The reducer for the blow-off pipe should be securely fastened to the pipe line. If not welded on, but put on with a rubber gasket coupling, it should be securely fastened in place with clamps and turnbuckles of sufficient strength to hold the valve and blow-off pipe in place, if it should be necessary to close them in an emergency.

In a welded line *small pin holes* may be caulked with a center punch, but porous, burnt or cracked welds should be re-welded. If the material in the weld is of such character that this cannot be done, the weld should be entirely cut out and a short piece put in with two new welds. When it is found necessary to reweld a joint, those in charge should *make certain* that the valves at each end are closed *and the pressure is entirely off the line.* If a strong wind is blowing, air might enter the line through an open blow-off valve and gas escape through the other open blow-off valve at the opposite end of the section, assuming there is such a valve at each end of each section. *One* blow-off valve should be closed in order to prevent the occurence of such a thing, which might fill the line with a mixture of gas and air. When leaks are found along longitudinal seams, indicating a bad joint made at the mill, such joint should be taken out of the line and replaced with new pipe. Sections of pipe should be tested and retested to full line pressure until the section is gas tight.

If there should be no telephone line along the route of the pipe line, it will be necessary for the men at the open end of the line to drive back and forth to the location of those operating the valve furnishing the gas, and arrange for definite periods to blow gas, agreeing on the time to open and close the valve. Once a blow is made and the valve is shut, it should *never be opened again* until requested by the men at the open end of the line.

NATURAL FOR ALABAMA FROM LOUISIANA BY DEC. 1

Ford, Bacon & Davis, Inc., engineers in charge of the Southern Natural Gas Corporation line being constructed from Louisiana to Atlanta, have announced that gas was turned into the line on November 12 at Monroe. Gas is expected to be turned into the mains of the city of Birmingham around December 1, and will reach Atlanta around the latter part of that month.

The line when completed will be 496.1 miles in length, with more than 400 miles of lateral lines, additional, being constructed. The main line is constructed of 20- and 22-inch pipe, and the lateral ines vary between 3 and 12 inches. Seven thousand men have been employed since last May on the line, which is the most extensive project yet to be constructed. The completed line will represent an expenditure of more than $25,000,000, the steel pipe and fittings, according to announcement, having cost $12,000,000. Many difficult and interesting engineering problems have been encountered, one of the most difficult being the extension of the line across the Mississippi River.

PLEASANT HILL GAS COMPANY TO ISSUE $100,000 IN STOCK

The State Public Service Commission of Missouri has granted authority to the Pleasant Hill Gas Company for the issuance of $100,000 in capital stock and for the continuance of the construction of gas pipe lines in Cass, Jackson and Johnson Counties. Charles I. Pruett is president of the company.

TWO COMPANIES COMBINE STUDY IN LIQUEFIED GAS EQUIPMENT

The Bastain-Blessing Company and the Pittsburgh Equitable Meter Company have recently merged their activity in connection with research and development of equipment for the liquified petroleum gas industry. The latter company will manufacture the regulators for the systems sold by the Bastian-Blessing Company.

Almost at the same time the engineers of these two companies turned their attention to the new liquified petroleum gas industry. The Bastain-Blessing Company has designed a number of patented devices which they are furnishing to this field. Likewise, the Pittsburgh Equitable Meter Company, has been studying the development of regulator equipment for these liquified gases. The research and development engineers of the two companies will work to produce regulators which will meet the needs of the industry.

OZARKS DISTRIBUTING CO. ASKS PERMIT FOR NINE TOWNS

Application has been filed by the Ozarks Distributing Company with the Missouri Public Service Commission for permission to serve natural gas to nine communities in the southwestern part of the state. Permission was also asked by the company to purchase all of the common stock of the Ozarks company.

The towns to be served under the grant are Billings, Monett, Marionville, Pierce City, Republic, Aurora, Forest Park, Mount Vernon and Neosho. Gas would be served the cities from the lines of the Cities Service Gas Company.

MERCO-NORDSTROM ANNOUNCES PERSONNEL CHANGES

Several promotions are to be made in the organization of the Merco-Nordstrom Valve Company, effective January 1, by order of the board of directors.

Comfort E. Brown, Eastern divisional manager, will become vice-president in charge of sales, continuing his headquarters in New York City.

C. C. Evernham, Western divisional manager, becomes purchasing agent in charge of all purchases and will be stationed in San Francisco.

E. D. Rogers, Southern divisional manager, will become general sales manager and will make his headquarters in the San Francisco office.

ATCHISON-FALLS CITY LINE TO BE FINISHED IN DECEMBER

The Cities Service Gas line extending north and west from the company's line at Atchison, Kansas, to serve Horton, Hiawatha and Sabetha, Kansas, and Falls City, Nebraska, will be completed in December, according to report.

Rapid progress is being made in the construction of both the city distribution systems in these towns and in construction of the main line. Approximately 53 miles of 6-inch pipe make up the main line project.

NEW BULLETINS ON SAFETY APPARATUS PUBLISHED

Mine Safety and Appliances Company in November issued Bulletin No. 113 in the company's trade literature, describing the F-M continuous flammable vapor indicator. Bulletin No. 27, also just off the press, deals with the McCaa oxygen breathing apparatus, half-hour type. Copies may be secured by addressing the company at Braddock, Thomas and Meade Streets, Pittsburgh, Pennsylvania.

Sprague Semi-Chrome Leather

Resists Acids and Boiling Water

Now Used in All

Sprague Meters and Regulators

After

Five Years' Tests and Experiments

May we send you samples and data

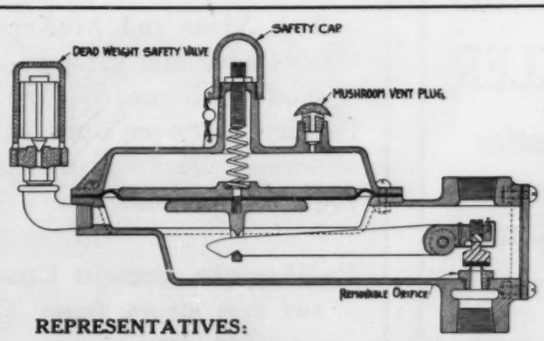
The Sprague Meter Co.

BRIDGEPORT, CONN.

Los Angeles, Calif., San Francisco, Calif.

Newark, Ohio

Davenport, Iowa Houston, Texas



PRESSURE REGULATION FOR ALL REQUIREMENTS

REPRESENTATIVES:

Seidenglanz & Co., Santa Fe Building, Dallas.

Midland Supply Co., Dwight Building, Kansas City.

GROBLE GAS REGULATOR COMPANY, Anderson, Ind.

Re-Chrome Meter Leather

Re-Chrome Meter Diaphragm

BESSE, OSBORN & ODELL INC. · BOSTON, U.S.A. · RE-CHROME METER LEATHER
COLONIAL BRAND

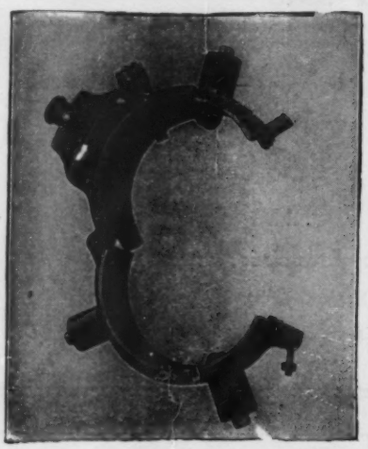
"Colonial" Brand

Made from choice New Zealand Lamb skins selected and tanned with the greatest care. Diaphragms made from this leather have the following advantages:—

Longer years service—More accurate measurement of gas—More impervious to water—Greater resistance to heat and climatic changes — Stronger fibre—Absorbs more oil—More Flexible—Eliminates "floppy" diaphragms.

Besse, Osborn & Odell, Inc.

51 South St., Boston 177 William St., New York



The STRICKLER

Ratchet Pipe Cutter

The STRICKLER Ratchet Pipe Cutter automatically cuts cast iron, steel and wrought iron pipe (from 1½ to 30" in diameter) by hand (either in the trench or in the shop).

You can cut any pipe from any position easily. Simply pump the handle and the STRICKLER does the rest. Order your STRICKLER Now

W. W. STRICKLER & BROS.

1475 Oak Street Columbus, Ohio

California Oxide

GAS Purification Requirements can be most efficiently cared for through the additional and improved facilities of our new plant in Southgate.

Both Maas and McKee Oxides have met gas purification requirements of the Pacific Coast over a period of several years and merit your investigation.

California Oxide Co.

308 East Eighth Street
Los Angeles

TRinity 0769

MURCHISON OIL COMPANY BUYS C. O. MOORE INTERESTS

Announcement has been made by the officials of the Murchison Oil Company, of Dallas, Texas, of the purchase from the C. O. Moore interests of the Arkansas Western Gas Company, a recently organized company holding natural gas franchises in Fayetteville, Rogers, Bentonville, Springdale and other northwestern Arkansas towns.

The consideration of the purchase was not made known, but it was said that the property at completion of pipe line and city plant systems would have a potential value of $1,925,000. The total number of meters to be served in the territory is estimated at 7,000.

The plans of the new owners for serving gas to the northwestern Arkansas towns are announced as being the same as those of the former owners, including construction of a line from the Clarksville, Arkansas fields. A contract to purchase gas from this field was secured recently, by the original company, from the Arkansas Natural Gas Company, a subsidiary of the Doherty interests. It is understood that plans will move rapidly forward to the completion of the line. The length of the line will be approximately 80 miles, and the diameter of the pipe will range between 4 and 8 inches, with the majority of the line being of 8-inch pipe.

Other gas systems owned by the Murchison interests are a 65-mile line originating in the Winkler County, Texas, field, which serves Wink, Pyotte, Wickett, Monahans, Barstow, Pecos, Cheyenne and other west Texas towns. In east Texas, 55 miles of main line are owned, serving Brenham, Hempstead, Prairie View, Waller and other towns. The Southern Union Gas Company, a subsidiary, owns the city distribution system in all of the above towns with the exception of Brenham, Texas.

Officials of the company are C. W. Murchison, chairman of the board; F. F. Murchison, president; E. T. Walters, vice-president, and Kenneth Murchison, secretary.

CANADIAN WESTERN NATURAL REPORTS GAINFUL YEAR

Canadian Western Natural Gas, Light, Heat & Power Company reports an unusually active year in natural gas development during 1929, expending $600,000 and laying 40 miles of distribution mains, making a total of 252 miles of transmission mains and 303 miles of distribution mains in service during the closing months of the year. The company now supplies a total of 19,000 customers in the municipalities of Calgary, Lethbridge, Macleod, Granum, Claresholm, Stavely, Parkland, Nanton, High River, Okotoks and Taber. Natural gas is supplied from Turner Valley fields.

BARTLESVILLE GAS AND ELECTRIC CO. IN NEW OFFICES

The Bartlesville Gas and Electric Company of Bartlesville, Oklahoma, a Cities Service organization, has moved its offices to new quarters. Formal opening at the new headquarters was held on the 7th of November, at which time gifts were presented to the first 1400 women who registered. Al Potter is manager of the company.

MONTANA-DAKOTA POWER CO. GETS ISMAY FRANCHISE

Montana-Dakota Power Company has secured the natural gas franchise at Ismay, Montana, and is starting preparations for constructing a transmission line. R. W. Peters will have charge of constructing the line for the company, and has taken up his residence at Ismay.

AMERICAN METER AUGMENTS RESEARCH PERSONNEL

A. J. Brooks, formerly sales manager of the Cincinnati sales division of the Vacuum Oil Company, is now associated with American Meter Company at Albany, N. Y.

Mr. Brooks is a graduate of Yale University College of Electrical Engineering, and of New York University, taking a degree in accounting. He has also had several years of technical manufacturing and sales experience.

Richard J. Clark, until recently general by-product foreman with the Consolidated Gas Company of New York, has also become associated with American Meter Company at the D. McDonald & Co. factory at Albany, N. Y.

Mr. Clark was awarded the physics and chemistry medals at Lehigh University, where he graduated in 1922 with honors in chemical engineering. Since 1922 his experience includes operating and experimental work with the Bethlehem Steel Corporation, the Jones Laughlin Steel Corporation, the Koppers Company, and the Consolidated Gas Company. He will devote his time to the research activities in displacement measurement that are being conducted in the recently enlarged Albany laboratory of American Meter Company.

ARGUS GAS COMPANY STARTS SERVICE AT ELKHART

Argus Gas Company of Dodge City, Kansas, has turned gas into the mains at Elkhart, Kansas, from the Hugoton fields, northeast of that place, and expects to supply gas to Sublette, Montezuma, Dodge City, Plains, Meade and Fowler around the first of December. These latter towns will be supplied from a line being constructed northeast from the Hugoton fields extending as far as Dodge City. A lateral line will serve Plains, Meade and Fowler.

The company has been reorganized, according to press report, into three units, the Argus Pipeline Company, the Argus Production Company and the Argus Gas and Fuel Company, all of which are incorporated under Delaware corporation laws.

SO. COUNTIES GAS CO. REPORTS PROSPEROUS 8-MONTH PERIOD

Southern Counties Gas Company, with headquarters in Los Angeles, California, in a report issued recently, giving figures for the current year as of August 31, stated that there is now a total of 132,873 gas meters in service as compared with 129,866 at the end of 1928. The total gas consumption for the first eight months of the year amounted to 12,883,460,000 cubic feet as compared with 12,908,169,000 for 1928. The company has over 3200 miles of mains distributing gas in 84 cities of Southern California.

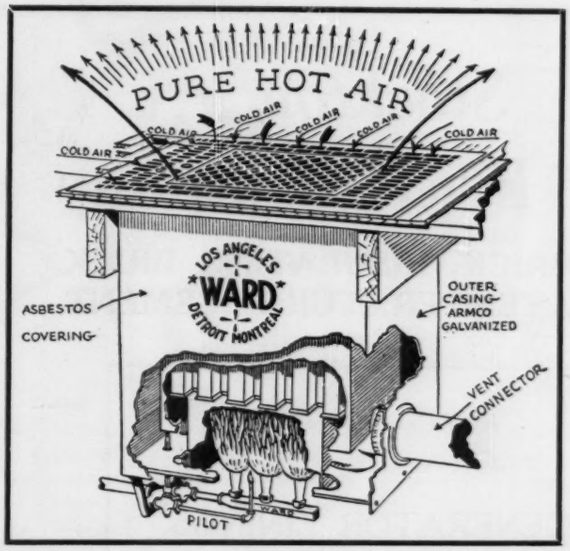
W. H. SHOPP IS TO REPRESENT STEIGER & KERR IN SO. CAL.

Warren H. Shopp has been appointed Southern California representative for Steiger & Kerr Stove & Foundry Company of San Francisco, California, manufacturer of Occidental ranges and cookers.

Mr. Shopp for five years was affiliated with the Southern Counties Gas Company in the engineering department.

CHOTEAU, MONTANA, SERVED BY PONDERA UTILITIES CO.

Pondera Utilities Company is now serving natural gas in the town of Choteau, Montana. Lines to Valier are nearly complete, and it is expected that natural gas service will be available in both cities for the winter season.



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A SALES BUILDER; A FRIEND MAKER.

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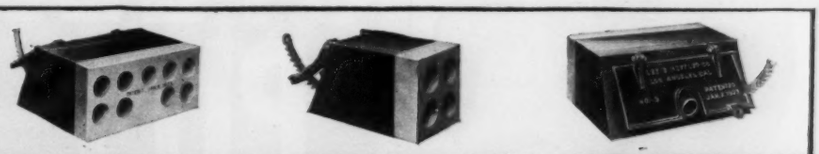

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Cleveland Baby Diggers are unequalled for downright usability and trenching satisfaction. Compact — transportable — economical. Tough — fast — dependable. Precision built of finest materials. A wheel type trencher on full crawlers. You'll find Cleveland Trencher pioneering the features that count. Write for particulars.

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MERCO-NORDSTROM CONTEST FOR SLOGANS CLOSES DEC. 31

Anyone wishing to compete for the $500 in cash prizes offered by the Merco-Nordstrom Valve Company for appropriate slogans that bring out salient points of the Nordstrom Valve, should submit his slogans on or before December 31, as the contest closes on that date. According to the rules of the contest, no one is barred from submitting slogans except employees of the company. Any number of slogans can be sent in by a contestant—but none can be more than 10 words in length to receive consideration.

The winner of first prize will receive $250; $100 is to be awarded for second prize, and $50 for third prize. There are also four prizes of $10 each and 12 prizes of $5 each—making a total of $500 in 19 cash prizes to be distributed in the contest. Replies should be addressed to 343 Sansome Street, San Francisco.

FIFTEEN TEXAS AND OKLAHOMA TOWNS ON 250-MILE MAIN

Gas is now being served by the Public Service Corporation of Texas in Canadian, Spearman and Perryton, Texas, three of a group of 15 towns which the company expects to serve in Texas and Oklahoma. The gas system when completed will comprise approximately 250 miles of main.

Other towns to be served by the company, which has headquarters in Fort Worth, Texas, are Miama, Laketon, Mobeetie, Glazier, Higgins, Follett, Darouzett and Booker in Texas, and Shattuck, Gage and Fargo in Oklahoma. Gas is to be piped from the Wheeler county fields.

Officials of the public service company are William Horwitz, president, M. A. Berman, vice-president; I. E. Horwitz, treasurer; and W. J. McCaslian, secretary. The company was organized last August under a Delaware charter.

SOUTHERN GAS CO. IS LOOPING LINE TO SAN ANTONIO

The Southern Gas Company, a subsidiary of the United Gas Company of Houston, is looping parts of its line, extending from the Calliham field in Southwest Texas to San Antonio, and is replacing parts of the line injured by corrosion. The length of the line is 68 miles. The company is also extending its line in northwestern Jim Hogg county to connect with the South Texas Gas Company's line extending to Monterrey, Mexico.

R. S. SHARP IS NAMED PRES. OF INDEPENDENT OIL AND GAS CO.

Announcement has been made of the election of Robert C. Sharp, formerly president of the Oklahoma Natural Gas Corporation and later president of the Southern Natural Gas Corporation, as president of the Independent Oil and Gas Company, of Tulsa. Mr. Sharp succeeds Edward H. Moore, organizer of the company, who has resigned. Waite Phillips is chairman of the board for the company.

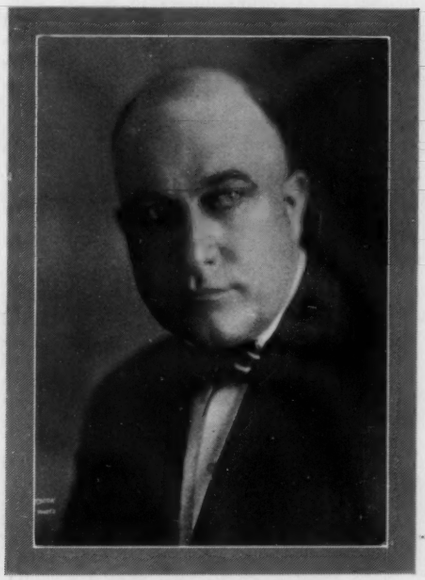
PETROLIA-FORT SCOTT GAS LINE IS COMPLETE

Announcement has been made by the Union Public Service Company of the completion of the 8-inch line from Petrolia, Kansas, serving Fort Scott. The new line comes direct to Fort Scott from the Petrolia fields lying between Chanute and Humboldt. The Union Public Service Company is distributor at Fort Scott.

C. C. BROWN NOW GAS AND ELECT. ENGINEER FOR COMMISSION

CLAUDE C. BROWN, who has been acting as natural gas administrator for California since July, 1927, has been appointed gas and electric engineer by the state Railroad Commission to succeed Charles Grunsky, who resigned to accept a position as supervising engineer with the management and engineering company which will direct the activities of the Pacific Public Service Corporation.

Mr. Brown will be head of the Gas and Electric Division of the Commission's Engineering Department, and in addition will continue for the present to act as natural gas administrator. He has been connected with the engineering activities of the Commission since November, 1922, when he was appointed assistant valuation engineer. In 1923 he was appointed gas engineer for the Commission, with headquarters at Los Angeles, and was appointed natural gas administrator in July, 1927, under an agreement between the companies in the Los Angeles area. In this post he exercised control of the allocation, distribution and utilization of natural gas in that area with marked success. Since the inception of the plan to bring natural gas to the San Francisco Bay area he has been devoting a major portion of his time to the problems involving rates and service of the natural product in the bay area.

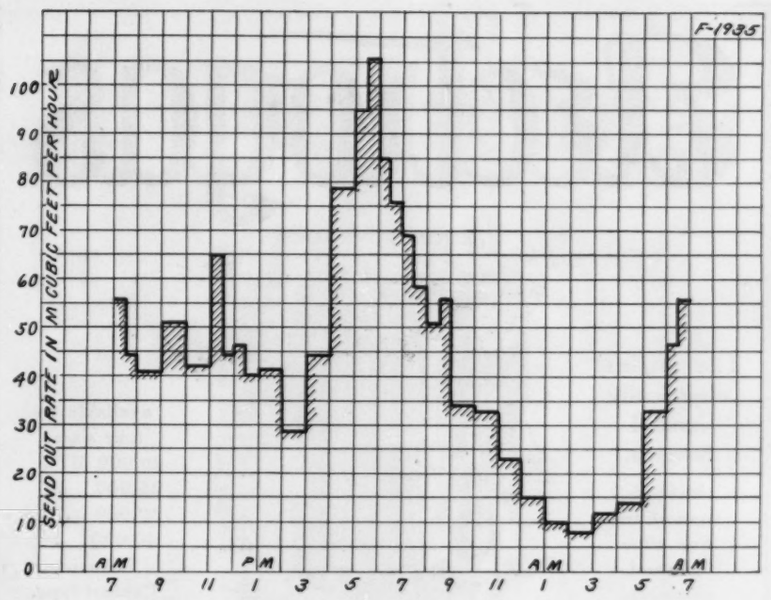


Claude C. Brown

Mr. Brown is a graduate of the University of California, School of Engineering, receiving his degree of Bachelor of Science in electrical and mechanical engineering in 1914. Prior to his affiliation with the Commission he engaged in engineering work for the J. G. White Engineering Company of New York, the Pacific Gas and Electric Company, Southern California Edison Company, Northern California Power Company, Pacific Light and Power Company, Southern Pacific Company and Pacific Mail Steamship Company.

JUNIOR GAS COMPANY BUILDS GAS SYSTEM AT HEAVENER

The Junior Gas Company is constructing a gas distribution system in Heavener, Oklahoma, the gas to be supplied from the field northwest of the city.



Connersville Meters maintain their accuracy of measurement through wide variations in flow.

The unit of measurement in a Connersville Meter is the displacement each revolution of the impellers. It is an unchanging volume, fixed by cast iron surfaces.

But, since the impellers are rotated by the flow of gas through the meter, the number of revolutions is controlled by the rate of flow.

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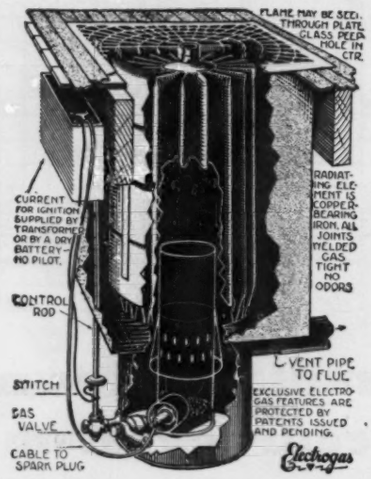
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Electrogas, now in its tenth year, has won a reputation for efficiency, freedom from servicing, and all-around satisfaction which is second to none. It will pay you to handle this remarkable appliance.

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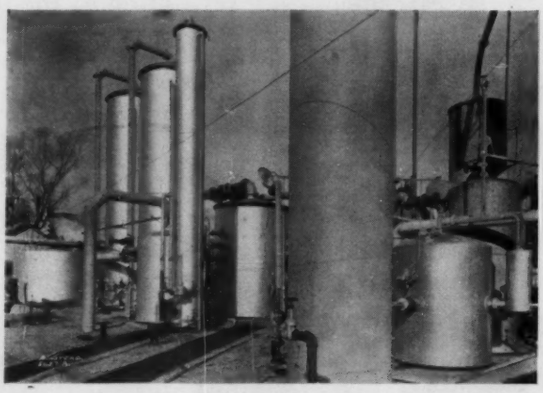
When It Rains



WHEN it rains is a good time to mend the harness; when witheringly hot, to sort the onions in the cellar.

When the price of crude is down, what better time to check over your equipment? A shutdown at this time costs less, you know.

Really, the best time to build a gasoline plant or install an absorber, a cooling tower, or MIST-D-FIER is NOW.

Better times will soon be here. Be ready when they come. 24% of all natural gasoline extracted in California is now produced by Campbell plants.

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KANSAS CHARTERS GRANTED TO SIX GAS COMPANIES

Kansas state charters have been granted to six gas producing and distributing companies to operate in the gas area near St. Paul. The companies, which are said to be subsidiary to the Sunflower Natural Gas Company, are the White Crow Oil and Gas Company, with headquarters at Pittsburg, Kansas; the Chanute Pipe Line Corporation, Chanute; and the Galesburg Gas Company, the Parsons Pipe Line Corporation, the Savonburg Gas Company and the St. Paul Gas Company, all of Fort Scott.

The first named company was authorized to issue 2,000 shares of no par stock and all other companies were empowered to issue 1,000 shares of no par stock, each. The Galesburg Gas Company, the Savonburg Gas Company and the St. Paul Gas Company are capitalized at $25,000 and the Parsons Pipe Line Corporation at $200,000.

The Sunflower Natural Gas Company, according to report, has contracts with practically all of the producers in the St. Paul field. This company has recently constructed a gas line from the St. Paul field into Parsons and has franchises in Galesburg, Savonburg and St. Paul to furnish natural gas to these towns.

Members of the board of directors of the new companies are: W. E. Murphy and F. P. Lock, Chanute; D. A. McGinnis, Iola; Albert Maretzek, Frederick C. Scofield and Francis I. Vanderbeak, New York City; James F. Pavlicek, Chicago, Illinois.

NEW RATES FOR DOMESTIC LOAD IN SAN FRANCISCO

Concurrent with the supplying of mixed natural gas to consumers in San Francisco and East Bay Cities, the Pacific Gas and Electric Company has recently filed with the Railroad Commission a new optional combination rate for house heating, water heating and cooking.

For residences and flats the new special heating rate is 50c per thousand and the minimum service charge is $2.25 per month for six rooms or less with an additional charge of 25c for each room in excess of six rooms.

The commercial heating rate for buildings has a charge of 35c per thousand for 625 B.t.u. gas, the service charge (minimum of $7.00 per month, or more) based on burner capacity.

T. R. WEYMOUTH ASKS OMAHA, NEB., FRANCHISE FOR HIS COMPANY

Thomas R. Weymouth, president of the Western Natural Gas Corporation and the Oklahoma Natural Gas Corporation has asked that the proposal of his company to supply natural gas to Omaha be voted on by the residents of the Nebraska city within the near future.

The Western Natural proposes to construct a gas line from the Texas Panhandle fields through northwest Oklahoma and across Kansas to Omaha. The line would be about 500 miles long and would cost approximately $24,000,000.

200 PER CENT GAIN REPORTED FOR MISSOURI-KANSAS CO.

Frank P. Parish, president of the Missouri-Kansas Pipe Line Company, has reported natural gas sales for his company for the month of October as being 400,000,000, a gain of 200 per cent over the sales for the same month last year. The American Pipe Line Company of Kansas City, a subsidiary of the Cities Service organization, is the largest purchaser of the gas.

NEW MAP IS RESULT OF TWO YEARS OF SURVEY WORK

The State Geological Survey of Arkansas has recently published a new geological map of the state, being the result of two years of work by the Survey under the direction of Dr. George C. Branner, state geologist of Arkansas.

Data on the Arkansas Valley area, on the early red bed explorations in southeast Arkansas and the geology of the Ozark Mountains are shown together with data on the Ouachita mountain region, the Coastal plain region and on all of the gas fields.

E. O. Ulrich, C. L. Dake, Josiah Bridge, E. T. McKnight, A. W. Giles, Bryan Parks, A. J. Collier, H. D. Miser, Carey Croneis, L. S. Griswold, A. H. Perdue, R. D. Mesler, Carl H. Dane, P. D. Torrey and W. C. Spooner were among the authors contributing the data for the survey. Editorial work on the book was done by H. D. Miser and George W. Stone and the geologic drafting by Perale L. Vlackman and C. A. Weekerly. The map, in colors, was printed by the United States Geological Survey.

UTILITIES UNITE TO FORM NEW INDUSTRIAL BUREAU

Six utilities operating in the south have united in the formation of the Southern Industrial Engineering Bureau, for the purpose of promoting the expansion of existing industries and the establishment of additional factories and mills, according to report.

The utilities represented in the group are Arkansas Power and Light Company, Louisana Power and Light Company, Memphis Power and Light Company, Mississippi Power and Light Company, New Orleans Public Service Company and West Tennessee Power and Light Company.

P. G. AND E. INTRODUCES LIGHT OIL ODORANT

As a safety factor in the distribution of straight natural gas the Pacific Gas and Electric Company is installing equipment through which an odorant in the form of a light oil will be sprayed into the gas. The sprayed gas will have an odor similar to the manufactured gas and will be quite noticeable should there be leaks or unlighted burners in the house. The equipment is already in operation in Fresno, San Jose and Hollister.

F. L. CHASE NAMED PRESIDENT OF TECHNOLOGY CLUB

Frank L. Chase, vice-president of the Lone Star Gas Company, was elected president of the Technology Club of Northern Texas, at the annual meeting of the organization recently held in Dallas. The club is composed of alumni and former students of the Massachusetts Institute of Technology.

MISSOURI NATURAL GAS CO. ASKS TO SERVE FARMINGTON

Missouri Natural gas Company has made application for a natural gas franchise at Farmington, Mo. If the franchise is granted, gas will be supplied from the Mississippi River Fuel Corporation gas line extending from Louisiana to St. Louis, according to report.

INTER-STATE GAS CO. GETS MISSOURI FRANCHISE

Adrian, Drexel and Archie, in Missouri, have granted natural gas franchises to the Inter-State Gas Company. Gas will be supplied from gas acreage in that territory according to announcement. J. W. Huffman is president of the Inter-State company.

A Differential Regulator FOR MIXING GASES

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In the conservation of our natural gas by mixing with coke-oven gas this regulator is destined to have a place of importance.

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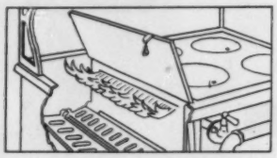
Why encouraqe qas consumers to heat the kitchen with coal or wood when they can use the perfect fuel in the **SPARK** kitchen heater  with the patented qas burner?

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Chock full of valuable information with hundreds of illustrations covering "Everything for Mine and Industrial Safety". . . an exceedingly useful catalog for all those interested in the safety and welfare of their fellow employees.

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WANTED—Young single man with engineering and operating experience in the natural gas and petroleum industry to install pressure and temperature controlling instruments. Fine opportunities for promotion and travel throughout all districts where oil refineries are located or natural gas used. Write for appointment for interview, stating age, education, experience and salary desired. Address B-93, *Western Gas*, 124 West Fourth Street, Los Angeles, Calif.

SITUATION WANTED—MALE

Young married man, 24 years of age, gas meter and general utility man, of six years experience, desires connection in Southern California or Arizona. Can give best of references. Address B-94, *Western Gas*, 124 West Fourth Street, Los Angeles, Calif.

MOODY-SEAGRAVES BUYS OPTION FOR PURCHASE OF PROPERTIES

Newspaper announcements have been made of the posting in New York of $1,000,000 by the Moody-Seagraves interests for an option on the purchase of the Magnolia Gas Company and the Latex Gas Company, subsidiaries of the Magnolia Petroleum Company, operating in Texas and Louisana. The option is said to remain in effect until the 1st of January. Fred M. Lege, Jr., is president and general manager of the Magnolia Gas Company, with headquarters in Dallas.

B. W. MUELLER RETURNS TO S. F. FROM EASTERN TRIP

Bernard W. Mueller, San Francisco factory representative, has just returned from a six-week trip in the East, during the course of which he visited the home offices of the Inertol Company, New York, manufacturer of "Imunol," and the plant of the Spencer Thermostat Company in Cambridge, Massachusetts.

AMARILLO, TEX., VOTES AGAINST PURCHASE OF GAS SYSTEM

In a recent election at Amarillo, Texas, municipal ownership of the gas company was defeated. The $2,000,000 bond issue which was being voted to acquire the ownership of the local gas company lost by a vote of 1,894 to 1,291.

EUDORA, ARK., NOW PIPED FOR NATURAL SERVICE

Eudora, in southeastern Arkansas, has been piped for natural gas by the Arkansas Power and Light Company. Both electricity and gas are now served by this company at Eudora.

EMPIRE
Oil Meters

Positive Displacement
Oscillating Piston Type

Simple in Construction—Easy to Operate—Low in Cost of Maintenance

EMPIRE meters are highly accurate, and **stay** accurate. They are invaluable for cracking and absorption processes; for gas companies; for refiners and distributors of gasoline and all distillates of petroleum; for measurement of crude oil, cold or hot.

ALL SIZES ⅝" TO 6"

Standard meters will withstand working pressures of 150 lbs. to the square inch. High pressure types will handle 300 lbs. Higher pressures and special types to order.

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Chemists—Engineers
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Analyses and tests. Represent Pittsburgh Testing Laboratory for inspection at Eastern foundries, mills and shops.
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WESTERN GAS from time to time receives requests from manufacturers asking to be put in touch with capable men or organizations in the Southwest or on the Pacific Coast who are able to effectively market their products in the western gas industry.

We also receive requests for suggestions from men or selling organizations covering the Pacific Coast as well as the Mid-Continent section, who desire to extend their activities in this industry by taking on new products or additional lines.

If we can be of service to you in this way, get in touch with any one of our three offices—Los Angeles, 124 West Fourth Street; Dallas, 307 Thomas Bldg.; San Francisco, 447 Sutter Street.

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LEFe31

IT BROUGHT THE MILLIONS A BASIC NECESSITY

The immediate result of the entry of A. O. Smith into the pipe business is the expansion of the natural gas industry.

With that expansion, however, came other results of great interest far beyond the industry.

Because SMITHWelded Pipe made that expansion possible, it ALSO:

Brought the millions a basic necessity—heat—in a more convenient and economical form.

Brought quicker returns to thousands of investors in pipe line projects and projects dependent upon pipe lines.

Increased the business of all manufacturers of equipment utilized in pipe line construction and operation or consumption of gas as a fuel.

Stepped up steel mill production to new levels and made a new fuel available to the manufacturing industries.

Transformed a great natural resource from a waste to a utility for the millions.

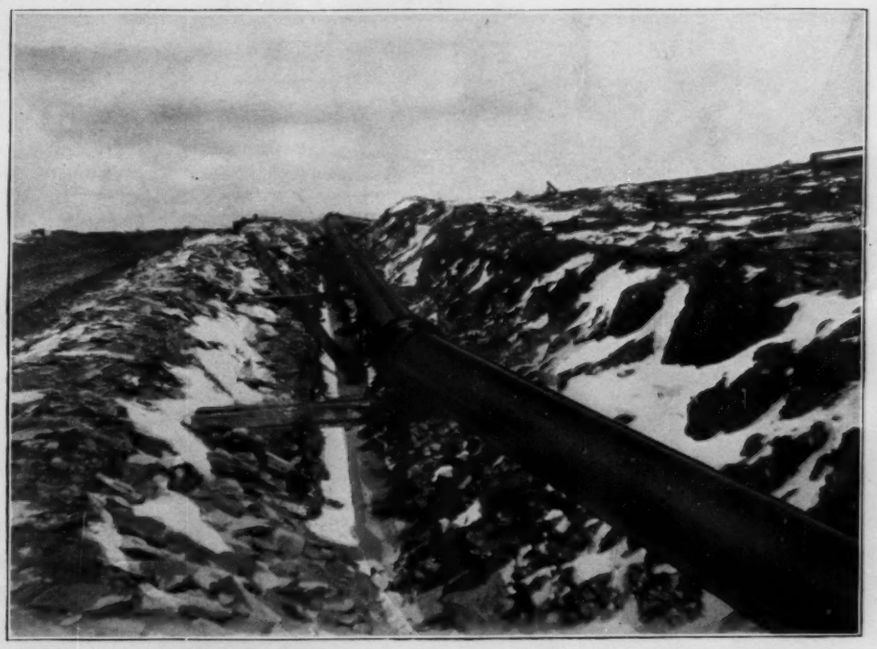
In an ever-widening circle it brought more business, more profits, more employment, more comfort and enjoyment of life far beyond the limits of the industry that it serves.

A. O. SMITH CORPORATION

General Offices: Milwaukee, Wisconsin

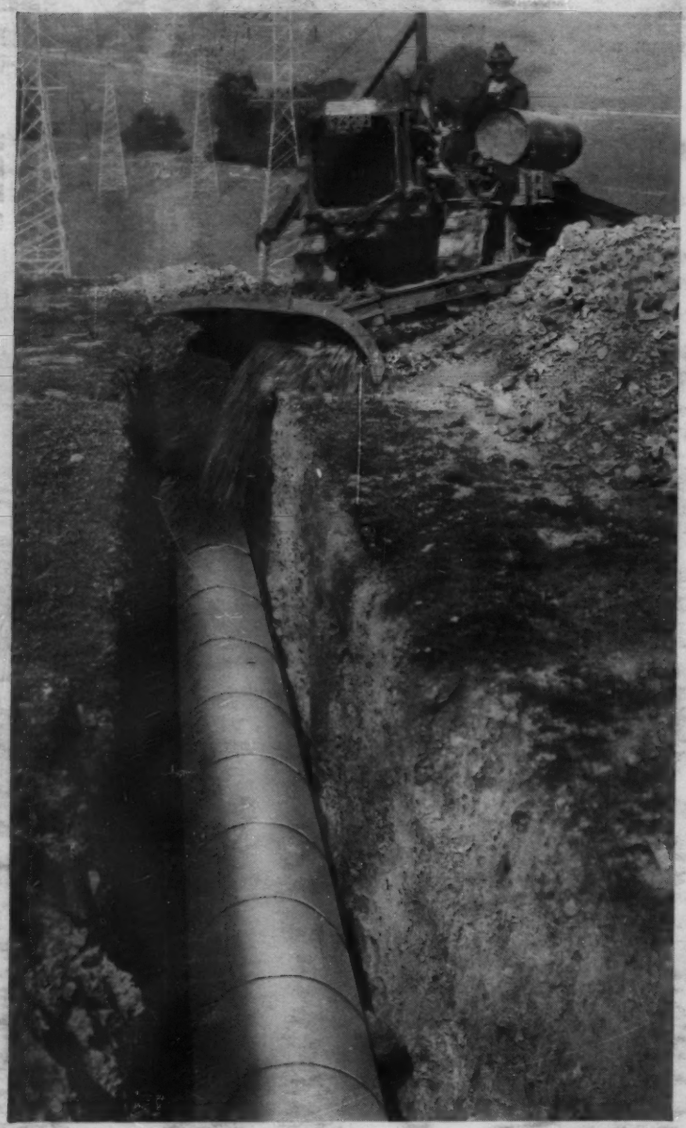
Oil and Gas Field Products Division

District Offices: New York - Tulsa - Houston - Los Angeles



SMITH*WELDED* GAS LINE PIPE

It's good common sense to guard your pipe line investment



The best precautions are none too good to guard your investment when the backfill takes it from your appraising eye, and it goes to work for you.

The best practice heretofore has been the hand coating of the pipe—in the field—with all the attendant difficulties of uncertain weather and labor to contend with.

Over 3000 miles of pipe laid during the past few months has been lowered into the ditch with the satisfying knowledge that every square inch had received uniform protection.

This pipe purchased through the mills listed below, was *mechanically* coated and wrapped *at the mill*, by the Hill, Hubbell & Co. process. It was delivered in the field ready for weld and backfill. It was bought, and is being purchased in increasing quantities by far sighted line operators who are anxious to gain maximum service from their new lines.

The Hill, Hubbell & Co. Machine Coating and Wrapping Process has been developed by the same group who for twenty-three years have specialized in protective coatings for metal. The location of their plants adjacent to six prominent pipe mills enables you virtually to write your own pipe life insurance policy at the time your order for pipe is placed.

We are prepared to wrap pipe up to 24-inch diameter, and to conform to any specifications as to the number of machine applied hot coatings and wrappings required.

Hill, Hubbell & Company Pipe Coating and Wrapping Plants are equipped to handle the production of the following mills:

CENTRAL TUBE COMPANY, Ambridge, Pa.; SPANG-CHALFANT & COMPANY, Ambridge, Pa.; YOUNGSTOWN SHEET & TUBE COMPANY, Indiana Harbor, Ind.; NATIONAL TUBE COMPANY, Lorain, Ohio; A. O. SMITH CORPORATION, Milwaukee, Wisc.; YOUNGSTOWN SHEET & TUBE COMPANY, Youngstown, Ohio.

BITURINE COATINGS

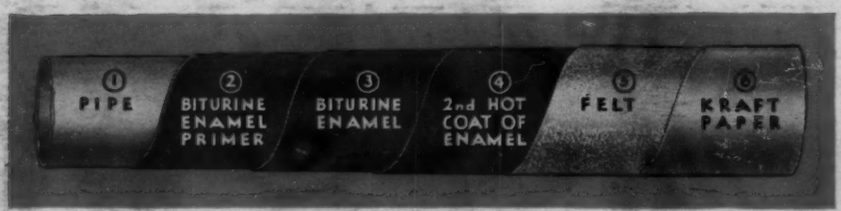
Biturine Enamel — *Biturine Solution No. 5*
Biturine Enamel Primer — *Biturine 70-30*
Biturine Coupling Mixture

This group represents the fruits of more than 20 years of careful research and practical experience. Biturine Enamel and Primer are particularly adapted to the Hill, Hubbell & Company process of mechanically applying protective coating to the pipe at the mill.

GENERAL PAINT CORPORATION

HILL, HUBBELL & COMPANY DIVISION

CHICAGO NEW YORK TULSA HOUSTON SAN FRANCISCO OAKLAND
LOS ANGELES PORTLAND SEATTLE SPOKANE



Hill, Hubbell & Company Machine Coated and Wrapped Pipe is Your Best Insurance Against Corrosion